REMARKS

Claims 1-37, 39-46, and 51-56 are pending. Applicants have made minor amendments to Claims 1, 6, and 13. Support for these amendments can be found in the respective claims, themselves. The Applicants submit that these minor amendments and corrections herein are made without prejudice as to patentability, including the doctrine of equivalents, and that no new matter has been added. The Applicants also respectfully submit herewith evidentiary support by way of a Declaration of Richard G. Fiscella (Exhibit 1) necessitated by an apparent misunderstanding by the Examiner of the scope of the claimed embodiments of the present invention.

Claims 1-37, 39-46, and 51-56 Are Not Obvious

The Examiner rejected Claims 1-37, 39-46, and 51-56 under the provisions of 35 U.S.C. § 103(a) as being unpatentable over "The Effects of Hospital Contracting for Physician Services on Hospital Performance" (hereinafter "Snail") allegedly published in the Spring of 2000, in view of U.S. Patent No. 6,000,828 (hereinafter "Leet"). Applicants respectfully traverse the rejection.

The Present Claimed Invention

Applicants recognized that physicians in a healthcare practice participating in an insurance network were having difficulty maximizing reimbursements due to the amount of management, organization, time and/or initiative necessary to follow the requirements of the insurance network and/or multiple insurance networks each having a different set of requirements which would need to be complied with in order to maximize such reimbursements. Embodiments of the present claimed invention advantageously provide methods and systems of intervention to change physician behavior management for physicians within a healthcare practice participating in an insurance network (open, out-patient environment) designed to increase profitability of the individual physician, the healthcare practice and/or the insurance network, that is unique and operationally quite different than other methods and systems as set forth in the cited documents. Various claimed embodiments, for example, include "gathering data...from each of a plurality of physicians in the healthcare practice...; identifying...[those] at a greater risk of not receiving [a] predetermined reimbursement amount...;

modifying....management behavior..., substantially reducing the risk of not receiving the predetermined reimbursement amount...."

Snail and Leet Fail to Recognize the Problem or Source of the Problem

As an initial matter, neither Snail nor Leet recognize the specific source of the problem, as identified, addressed and solved by embodiments of Applicants' claimed invention. That is, neither Snail nor Leet recognize, for example, ancillary pharmacy costs management behavior or other ancillary medical costs management behavior of physicians of a healthcare practice participating in an insurance network as the source of the problems of, for example, maintaining profitability of the healthcare practice and/or the insurance network. *See, e.g.*, Exhibit 1, paras. 5b1-b2 (Declaration of Richard G. Fiscella). As noted previously, the Supreme Court in *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45 (1923), has long acknowledged that recognition of a problem not previously recognized by others is part of the invention. *See also* MPEP 2141.02III ("[A] patentable invention may lie in the discovery of the source of a problem...."). This holds true even if the "remedy" is obvious, which Applicants vigorously contend it is not. As previously pointed out in the response filed on October 30, 2006, Applicants' recognition of the source of the problem and Applicants' methodology or solution to address and solve the particular problem, at least in part, relates to gathering data on physician cost control risk or behavior, identifying those physicians at a greater risk, and behavior modification of physicians to reduce or control costs or expenses associated with such risk. Applicants submit that the recognition of this unrecognized source of the problems and the novel and nonobvious solutions provided by Applicants' claimed embodiments of the present invention are both indicators of nonobviousness of the claimed embodiments of the present invention, when both the claims and the cited documents are viewed as a whole.

In particular, for example, Claim 1 includes the solution for managing a healthcare practice to enhance profitability of the healthcare practice, by gathering data in a computer medium on ancillary pharmacy costs for each of a plurality of physicians in a healthcare practice participating in an insurance network, identifying at least one of the physicians that is at a greater risk of not getting reimbursements by prescribing medications that are detrimental to receiving reimbursement, and substantially reducing the risk of not receiving the predetermined

reimbursement amount for the ancillary pharmacy costs from the insurance network to increase the profitability of the healthcare practice by modifying management behavior for those at risk of not receiving reimbursement. Also, for example, as in Claim 13, the solution can be applicable to other ancillary medical costs; and as in Claim 25, the solution can have a financial incentive to the insurance network and physicians in the healthcare practice. Also for example, as in Claims 37 and 46, the solution can be applicable to and implemented by a computer system. As such, Applicants, through recognition of the source of the problems, clearly have provided elegant methodologies or solutions to these problems. The specific recognition of the source of the problems and elegant methodologies or solutions are not found in the cited documents--not alone or in combination. *See, e.g.*, Exhibit 1, paras. 5b1-5b2.

Persons of ordinary skill in the art who endeavor to develop either Applicants' claimed solutions or alternative solutions to the problems recognized by Applicants simply would *not* seek out the cited documents, which both alone, and in combination, fail to recognize both the problems solved by the Applicants' claimed methodologies and their source. *Id.*

No Prima Facie Case of Obviousness

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, at least three basic criteria must be met. There must be some suggestion or motivation, either in the prior art references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify or combine the reference or teachings. *See* MPEP 2143. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *See* MPEP 706.02(J) *citing In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Also, there must be a reasonable expectation of success in modifying or combining references. However, "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." *See In re Fritch*, 23 U.S.P.Q. 2d 1780, 1784 (Fed. Cir. 1992). Finally, the prior art references, as combined, must teach or suggest all the claim elements. The Applicants respectfully submit that neither of the cited documents suggest any explicit or implicit motivation or desire to combine the documents to

accomplish the claimed embodiments of Applicants' present invention. Further, Applicants respectfully submit that both Snail and Leet are not analogous art because teachings with respect to *closed healthcare systems* are not reasonably pertinent to the particular *open healthcare system* problems with which the Applicants are concerned.

No Motivation to Combine Snail and Leet

Applicants respectfully submit that the Examiner has failed to meet the first element of a *prima facie* case for obviousness. First, there is no explicit suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. The Examiner has the burden of showing, as such, and has not met it here. Nor is there anything implicit suggesting combining the references, as the combined teachings, knowledge of one of ordinary skill in the art, and nature of the problem to be solved, as a whole, would not suggest doing so to those of ordinary skill in the art, as is required in MPEP 2143.01 and *In re Kotzab,* 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000).

As previously pointed out in the response filed on October 30, 2006, neither Snail nor Leet, alone or in combination, is directed to a system or method of managing a healthcare practice participating in an insurance network to enhance profitability of the healthcare practice with respect to a predetermined reimbursement amount for ancillary pharmacy or ancillary medical costs. In fact, Snail and Leet are different to the point of being non-analogous references. *See, e.g.*, Exhibit 1, para. 5c1. For example, Snail, as a whole, teaches the effects of hospital contracting for physician services on hospital performance. Leet, as a whole, teaches a methodology of improving drug effectiveness for a specific treatment for a specific populace by determining emerging patterns of microbial drug resistance in a community and altering patterns of antimicrobial prescribing to reduce, and thus, solves the problem of, microbial evolutionary pressures that produce resistant organisms. In contrast, embodiments of Applicants' claimed invention, as a whole, teach methods of and systems for enhancing profitability with respect to ancillary medical and ancillary pharmacy costs of a healthcare practice participating in an insurance network (*open* healthcare system).

Additionally, neither Snail nor Leet are reasonably pertinent to the particular problem with which the Applicants were concerned. *Id.* Both Snail and Leet apply only to hospitals or *closed* healthcare systems where the claimed embodiments of Applicants invention apply to outpatient care or open healthcare systems. This is an important distinction because *closed* healthcare systems have different procedures, rules, and governing regulations, along with different procedures, authorization, management, and record-keeping requirements than that of *open* healthcare systems. Applicants respectfully submit that this distinction, known and readily recognized by those skilled in the art, *see, e.g.*, Exhibit 1, para. 5b, was improperly dismissed by the Examiner. The teachings of one is simply not readily transferable due to such significant disparities. *See, e.g.*, Exhibit 1, para. 5c1.

Thus, the combined teachings, knowledge of one of ordinary skill in the art, and nature of the problems to be solved, as a whole (enhancing profitability of a healthcare practice participating in an insurance network regarding management of ancillary medical costs), do not suggest combining these disparate references, as the combination would not solve the Applicants' problem. *Id.*

Second, the Examiner's statements, alone, for example, that it would have been obvious to incorporate a computer tangible medium into the system of Snail to "reduce[e] the amount of paper records needed by Snail by automating the data collection process" (see paper No. 20070108A, para. 5) is insufficient to establish a *prima facie* case of obviousness, even assuming the combination would actually solve the problems (which it would not). Even assuming a motivation and an ability to combine the references, MPEP 2143.01III states the "fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the *desirability* of the combination." (Emphasis added). Neither of these disparate documents suggest such desirability. *See, e.g.*, Exhibit 1, para. 5c2.

In the present case, there is no explicit or implicit suggestion as to the desirability of the combination. *Id.* One must keep in mind that Snail is a dissertation discussing the effects of "hospital contracting" for physician services on "hospital performance," rather than on solving healthcare practice profitability issues. *See* Snail, abstract, para. 1. Leet provides a computer-based tool that can be used to recommend drug treatments which are allowed to evolve in response to changing medical information, side effects encountered, and patterns of disease

resistance, to thereby recommended treatments; evaluate drug treatments to help improve drug treatments in the community in which the treatment is being provided; detect emerging patterns of microbial drug resistance in a community; and alter patterns of antimicrobial prescribing to reduce microbial evolutionary pressures that produce resistant organisms. *See* Leet, col. 3, lines 10-25. Clearly, there is a huge disparity in the teachings of Snail and Leet. Accordingly, such disparate teachings and disparate problems to be solved, as a whole, would not have suggested to one of ordinary skill in the art that combining reference teachings would be desirable or lead to a desirable result. *See, e.g.*, Exhibit 1, paras. 5c1-5c2.

Further, Applicants respectfully submit that the Examiner has overlooked an important point that the motivation to combine references must be to produce a "proposed modification of the applied reference(s) necessary to arrive at the claimed subject matter." *See* MPEP 706.02(j). Even if Snail and Leet could be combined and that either one or both suggested such desirability, because Snail (*closed* healthcare system) is so clearly directed outside the field of Applicants endeavor (*open* healthcare systems), the combination would not produce the claimed embodiments of Applicants' invention. *See, e.g.*, Exhibit 1, para. 5c3. As such, one skilled in the art would not be motivated to combine these disparate documents to attempt to produce the claimed embodiments of Applicants' invention. *Id.*

Accordingly, as a minimum, there is no motivation or suggestion to combine such disparate teachings of these documents accept by improper hindsight to somehow try to arrive at the claimed embodiments of the present invention, and each of these documents alone, and in combination, fails to disclose, teach, or suggest the claimed embodiments of the invention. *See, e.g.*, Exhibit 1, para. 5c1-5c3. Therefore, Applicants further respectfully submit that the first element of a *prima facie* case of obviousness has not been satisfied, and for this reason, the claimed embodiments of the invention are novel, non-obvious, and define over Snail and Leet.

No Reasonable Expectation of Success

As will be described in more detail below, even if the cited documents could be combined, Leet fails to disclose, teach, or suggest gathering data regarding physicians in a healthcare group in a tangible computer medium. Rather Leet discloses gathering data regarding specific diseases and treatment in order to form an intelligent diagnostic tool which can provide

to a physician a recommended treatment including comparative drug costs, predicted total number of unit doses, and projected total cost of administering each recommended treatment. *See* Leet, col. 3, line 41 to col. 4, line 41. This is not the same as gathering in a tangible computer medium from [(regarding)]...physicians in a healthcare practice...ancillary medical or pharmacy costs data, identifying certain physicians from the tangible computer medium..., or modifying management behavior of at least one...physician...." Without recognition of the source of the problems identified and addressed by the inventors in the subject patent application, Snail and Leet simply could not know, and therefore could not disclose, teach, or suggest, what to change in order to solve such problems. *See, e.g.*, Exhibit 1, para. 5d1. Thus, without this missing feature, the combination could not produce the claimed embodiments of Lewis et al.'s invention.

Further, even if Snail and Leet could be combined and that either one or both documents suggested such desirability, as noted previously, because Snail (*closed* healthcare system) is so clearly directed outside the field of Applicants endeavor (*open* healthcare systems), the combination could not produce the claimed embodiments of Applicants' invention. *See, e.g.*, Exhibit 1, para. 5d2. Applicants respectfully submit that the Examiner has overlooked this important point. As such, there is no reasonable expectation of success that the proposed combination would produce the claimed subject matter.

Therefore, the second element of a *prima facie* case of obviousness has not been satisfied, and for this reason as well, the claimed embodiments of the invention are novel and non-obvious and define over the cited documents.

Snail and Leet Do Not Teach or Suggest All the Claim Elements

Applicants submit that neither Snail nor Leet, alone or in combination, teach or suggest all of the elements of the claimed embodiments of the present invention. The Examiner references Appendix 2 of Snail for the premise that Snail, in general, teaches the identifying and the modifying steps of, for example, Claim 1, and references Leet, col. 15, lines 11-28, for the premise that Leet teaches the gathering step. Applicants respectfully submit that the Examiner is mistaken. Snail, like previously cited Freeman and Dang, describes "administrative" methods. Embodiments of the claimed invention instead teach "control." As noted previously, when

addressing a change program, for instance, the process must address: (1) what to change, (2) what to change to, and (3) how to cause or affect the change. Snail, even when combined with Leet, fails to offer a change process or solution, much less one applicable to an open healthcare system. In contrast, embodiments of the claimed invention offer a solution for controlling costs and managing associated physician behavior to enhance physician, healthcare practice, and/or insurance network profitability, applicable only to an open healthcare system.

Stated another way, Snail fails to provide a teaching of even the subject matter identified in the preamble of the independent claims, much less the specific elements of the independent claims. *See, e.g.*, Exhibit 1, para. 5e2. Claim 1, for example, features a method of managing a healthcare practice participating in an insurance network to enhance profitability of the healthcare practice with respect to a predetermined reimbursement amount for pharmacy costs--a solution for managing a healthcare practice to enhance profitability of the healthcare practice. To accomplish this method, Claim 1 features, at least in part, gathering data in a computer medium on ancillary pharmacy costs for each of a plurality of physicians in a healthcare practice participating in an insurance network, identifying at least one of the physicians that is at a greater risk of not getting reimbursements by prescribing medications that are detrimental to receiving reimbursement, and substantially reducing the risk of not receiving the predetermined reimbursement amount for the ancillary pharmacy costs from the insurance network to increase the profitability of the healthcare practice by modifying management behavior for those at risk of not receiving reimbursement. Also, for example, as in Claim 13, the solution can be applicable to other ancillary medical costs; and as in Claim 25, the solution can have a financial incentive to the insurance network and physicians in the healthcare practice. Also for example, as in Claims 37 and 46, the solution can be applicable to and implemented by a computer system.

Snail discloses that statistical profiles can be used to gather data and compare individual physicians to other peer physicians. Snail, however, fails to disclose, teach, or suggest that "incentive payments are...based on [ancillary medical] costs." *See, e.g.*, Exhibit 1, para. 5e3. Snail, page 161, lines 1-4, references a footnote which shows results of a physician compensation survey on physician group practices offering incentive-based payments. Applicants believe that the Examiner is using such information to somehow extract a teaching of controlling physician behavior through use of ancillary medical costs. The data provided,

however, indicates that group practice incentive payments averaged 10% of total compensation. Of this, only 10% of the 10% was based on "service and overhead costs." In other words, there was only a maximum of a 1% total impact. Further, the data provided that just over half of the Hospitals have incentive payments, which average 15% of total compensation, but there is no mention of "service and overhead costs" impact. Finally, Integrated Delivery Systems incentive payments average 5% of total compensation, and again, there is no mention of "service and overhead costs" impact. It is clearly indicated that there is only a miniscule impact of costs on incentives. *See* Snail, page 161, lines 15-30. When such factor is so diminutive, it can be expected to have little or no effect. *See, e.g.*, Exhibit 1, para. 5e3. Thus, contrary to the teachings of Applicants which requires ancillary medical/pharmacy costs to be a controlling factor, even excessively high ancillary medical or pharmacy costs combined with some other factors important to Snail would result in a maximum or near maximum incentive payment, according to Snail. Therefore, one skilled in the art could not extract from this, a teaching or suggestion of utilizing ancillary medical or pharmacy costs as a method of behavior control, much less that specifically directed to physicians in a healthcare practice participating in an insurance network (open healthcare system). *See, e.g.*, Exhibit 1, para. 5e3.

Still further, nothing indicates that these "costs" referred to in Snail are anything other than "those attributed directly to a medical procedure performed by a physician," which were specifically excluded in the claims, themselves, from the Applicants' definition of ancillary medical costs. *See, e.g.*, Exhibit 1, para. 5e4.

As such, nothing in Snail discloses, teaches, or suggests that ancillary medical costs or ancillary pharmacy costs, as defined in the claims, affect physician management behavior. *See, e.g.*, Exhibit 1, paras. 5e2-5e4. Therefore, Snail clearly fails to teach or suggest that ancillary medical or pharmacy costs should be used to control physician management behavior as featured in independent Claims 1, 13, 25, 37, or 46, and thus, fails to provide a teaching of even the subject matter identified in the preamble of the independent claims, much less the specific elements of the independent claims.

More specifically regarding Claim 1, Snail, for example, fails to disclose, teach, or suggest the step of gathering data in a computer medium on ancillary pharmacy costs for each of a plurality of physicians in a healthcare practice participating in an insurance network regarding

management of ancillary pharmacy costs at least primarily in the form of pharmacy costs other than those attributed by a medical procedure performed directly by any of the plurality of physicians when the respective physician directly administers a medication to a patient. Although Snail arguably describes comparing hospital-based individual practices or collective physician practices to their peers along such dimensions as resource consumption, etc., and comparing physician profiles to either general practice guidelines or to other physician practices to evaluate performance to aid in contract negotiation ("negotiation and structuring of managed care contracts"), Snail, page 156, Snail provides no such teaching of gathering data on ancillary pharmacy costs as defined in the claim. *See, e.g.*, Exhibit 1, para. 5e5.

Snail also fails to disclose, teach, or suggest the step of identifying from the tangible computer medium at least one of the plurality of physicians in the healthcare practice participating in the insurance network that is at a greater risk of not receiving the predetermined reimbursement amount for the ancillary pharmacy costs from the insurance network by prescribing medications that are detrimental to receiving the predetermined reimbursement amount for the ancillary pharmacy costs. *See, e.g.*, Exhibit 1, para. 5e6. This claim step has several sub-elements, each individually important. First, as indicated by the Examiner, Snail does not teach the step of identifying any data from the tangible computer medium. Second, Snail does not teach application to a physician in an open healthcare system (i.e., in a healthcare practice participating in an insurance network), but rather is only directed to hospitals and possibly other closed healthcare systems. *See* Snail, abstract.

Next, Snail neither discloses, teaches, nor suggests "substantially reducing the risk of not receiving [a] predetermined reimbursement amount for ancillary pharmacy costs from [an] insurance network" by modifying physician behavior detrimental to such receipt, i.e., behavior outside the desires of the insurance network. *See, e.g.*, Exhibit 1, para. 5e7. Although Snail arguably identifies, again, in a hospital or closed healthcare system setting only, that use of incentive-based payments can control physician performance, such teaching does not transfer to the specific elements of this claim. Particularly, such teaching has nothing to do with management of physician behavior with respect to the desires of the insurance network. *Id.* Notably, encouraging a physician to select the cheapest pharmaceutical or forgo utilization of any pharmaceutical may, altogether, not be that which is desired by the insurance network. For

example, the specific pharmaceutical may be favored even though it is not necessarily the cheapest to the patient when compared to another equally suitable pharmaceutical. Snail provides no such teaching. Again, there is a significant disparity between procedures, rules, and regulations which govern *open* healthcare systems and *closed* healthcare systems. The teachings of one simply is not directly readily transferable to the other. *Id.*

Snail not only fails to disclose, teach, or suggest modifying ancillary pharmacy costs management behavior of the at least one of the plurality of physicians at the greater risk regarding the ancillary pharmacy costs, substantially reducing the risk of not receiving the predetermined reimbursement amount for the ancillary pharmacy costs from the insurance network to increase the profitability of the healthcare practice; in reading Snail, one should further conclude that Snail inherently teaches away from utilization of ancillary medical costs, including pharmacy costs, to control physician behavior. *See, e.g.*, Exhibit 1, para. 5e8. Applicants describe this as an inherent teaching because the author of the Snail dissertation explicitly stated that the available data provided in Appendix 2 "do[es] not permit hypothesis testing." *See* Snail, page 5, lines 1-3. Thus, Snail explicitly indicates that he did not have all the facts necessary to analyze governance mechanisms in physician practice organizations or the intention to test them, making Snail generally, and Appendix 2 specifically, in combination with the knowledge generally available to one skilled in the art at the time of the invention, a non-enabling disclosure with respect to this element even if Claim 1 was directed to a closed healthcare system (which it is not). *See* MPEP 2121.02I (analogously stating with respect to compounds and compositions, "the mere naming of a compound in a reference, without more, cannot constitute a description of the compound."). Notably, the Examiner did not directly counter this point in this final rejection other than to bypass comment by stating that "Applicants' have not identified a particular teaching that the Examiner has used that is not enabled..." (see Final Office Action, paper No. 20070108A, page 11, para. 28), when clearly Applicants did.

Nevertheless, the Examiner cites Snail, pages 162-163, as indicating that, with respect to general utilization management, education is a disclosed method of modification of physician behavior. "Education," however, is only mentioned once in the context of stating that "utilization management incentives can be instilled by...the structure of physician group practices, which encourages ongoing peer review, education, and innovation through a

nonadversarial relationship." Thus, the term "education" is a characteristic of the structure of physician group practices and not any sort of utilization management mechanism. *See, e.g.*, Exhibit 1, para. 5e9; *see also,* page 163, Table A2.3 (listing utilization management mechanisms but not including education as a utilization management mechanism).

Further, regardless of whether or not Snail discloses education as a method of modifying physician behavior (or any other professional for that matter), Snail fails to disclose, teach, or suggest applying such education to ancillary medical or pharmacy costs to modify physician behavior with respect to such costs, or in doing so, substantially reducing the risk of not receiving the predetermined reimbursement amount for the ancillary pharmacy costs from the insurance network to increase the profitability of the healthcare practice. *See, e.g.*, Exhibit 1, para. 5e9. As pointed out in the prior office action response, Applicants were unable to identify any passage indicating such teaching or suggestion either within or outside the pages cited by the Examiner. Modifying physician behavior with respect to ancillary medical or pharmacy costs and substantially reducing non-reimbursement risk leading to enhanced profitability of the healthcare practice are important features correspondingly not disclosed, taught, or suggested by either Snail or Leet, alone, or in combination. *Id.* Both features are important sub-elements; and the "reducing non-reimbursement risk" feature, in particular, is not an intended use, as alluded to by the Examiner, but rather, that which the behavior modification is directed to.

Although Snail was missing each of these elements, described above, the Examiner introduced Leet solely to support an alleged disclosure of a tangible computer medium for gathering data regarding *physicians*. Nevertheless, as noted previously, even if there was motivation to combine Snail and Leet (which Applicants contend there is not), Leet does not "fill in the blanks" with respect to this feature or the missing features, identified above. *See, e.g.*, Exhibit 1, para. 5e10. Leet, for example, fails to disclose, teach, or suggest the gathering data regarding *physicians* in a healthcare group in a tangible computer medium step, or the performing the identifying, modifying or reducing steps, even when combined with Snail. *Id.* Rather, Leet teaches gathering data regarding specific diseases and treatments in order to form an intelligent diagnostic tool, which can provide to a physician a recommended treatment including comparative drug costs, a predicted total number of unit doses, and projected total cost of administering each recommended treatment, etc. *See* Leet, col. 3, line 41 to col 4, line 41. As

also pointed out by the Examiner in this Final Office Action, the Leet system can also predict an estimated cost of treating a patient with a given drug or drug combination. *See* Leet, col. 15, lines 11-28. Notably, such information can be provided *to* a *physician*, but it is not data regarding ancillary pharmacy/medical costs management for physicians in a healthcare group participating in an insurance network, or a teaching or suggestion, thereof. *See, e.g.*, Exhibit 1, para. 5e10. Thus, as Leet fails to disclose, teach, or suggest even the element to which it was introduced by the Examiner as teaching, identified by the Examiner as missing from Snail, neither Snail nor Leet, alone or in combination, provide each and every element of independent Claims 1, 13, or 25; and as there is no teaching or suggestion that their combination would somehow produce the other missing elements, missing from both Snail and Leet, for the reasons provided above, the third element of a *prima facie* case of obviousness has not been satisfied. *Id.*

Accordingly, in view of the lack of motivation to combine the cited documents due to their noted disparities, overall failure to recognize the source of the problem as recognized by Applicants, lack of a reasonable expectation of success in developing claimed embodiments of the Applicants invention even using Applicants specification as a roadmap to do so, and lack of teaching or suggestion of each and every element of each independent claim, Applicants respectfully submit that Claims 1, 13, and 25 are novel, nonobvious and patentable over the cited documents. *See, e.g.*, Exhibit 1, para. 5e11. Note, independent system Claims 37 and 46 are also novel, nonobvious, and patentable over the cited documents for the reasons provided above. *Id.*

The dependent Claims 2-12, 14-24, and 26-36 (and Claims 39-45, and 51-56) have therefore also been shown to be allowable because their corresponding independent claims have been shown to be novel and non-obvious. Nevertheless, the dependent claims include independent novelty and are not obvious. *Id.*

For example, regarding Claims 2 and 14, neither Snail nor Leet, alone or in combination, disclose, teach, or suggest gathering information regarding the ancillary pharmacy (or medical) costs of each of the plurality of physicians in the healthcare practice participating in an insurance (or medical) network. *See, e.g.*, Exhibit 1, para. 5e12. Although Leet teaches gathering drug cost data from a drug inventory and cost database (28c), the data is not aggregated pharmacy or medical costs of a *physician* or a plurality of *physicians* of a practice, as featured in the claims, but rather an estimated cost of treating a specific patient with a specific drug or drug

combination. *See* Leet, col. 15, lines 11-28. Further, the Leet cost data is presented as a unique formula to rank drugs to treat a given condition (see col. 23, lines 7-8), which does not have a resulting unit of measure, because it adds both a time component, i.e., "average times drug administered per day" and cost components (see col. 23, line 19). Thus, it does not even teach providing an estimated dollar cost of patient treatment. Correspondingly, it cannot be an aggregate pharmacy or medical cost, much less that of a plurality of *physicians* in a healthcare practice, as featured in the claims. *See, e.g.*, Exhibit 1, para. 5e12.

Regarding Claims 3 and 15, neither Snail nor Leet, alone or in combination, nor the Examiner's official notice, disclose, teach, or suggest analyzing the ancillary pharmacy (or medical) costs of each of a plurality of physicians in a healthcare practice, calculating an average ancillary pharmacy (or medical) costs per physician for the healthcare practice, or identifying the physicians that have ancillary pharmacy (or medical) costs that are a predetermined percentage greater than the average ancillary pharmacy (or medical) costs per physician for the healthcare practice. *See, e.g.*, Exhibit 1, para. 5e13. The Examiner states that Snail discloses analyzing ancillary pharmacy costs. Snail, however, instead only states that "[p]hysician profiles are compared to practice guidelines for other physician practices to evaluate performance...essential to the negotiation and structuring of managed care contracts." *See* Snail, page 156, lines 6-7. These "physician profiles" are for "Selective Contracting" (page 155 Section Title) and not profiles in the management of ancillary pharmacy (or medical) costs, as featured in the claims. *See, e.g.*, Exhibit 1, para. 5e13. Snail defines "selective contracting" as "a constrained payment system in which buyers contract with a limited number of sellers based on their qualifications and prior performance, thereby establishing a competitive bidding process" (page 155, line 2-4). Snail defines "profiles" as a selective contracting tool that "compare[s] individual or collective physician practices to their peers along such dimensions as resource consumption (e.g. ancillary procedure usage), charges, and patient volumes and outcomes; some hospitals also track malpractice claims and third-party payment denials." *See* Snail, page 156, lines 1-4. Nowhere in that definition are any costs, or specifically, ancillary medical or pharmacy costs, mentioned as a measured component for selective contracting. *See, e.g.*, Exhibit 1, para. 5e13. Therefore, it is evident that the term "profiles" is used by Snail in a manner for contract management and not in a manner for ancillary cost management nor updating physicians of changes in their individual

costs relative to their peers. The Examiner, in essence, states that it is well-known to perform a statistical analysis to identify entities that are a predetermined percentage greater than the average. Applicants do not feature performing such a statistical analysis in this claim. Instead, Applicants' Claims 3 and 15 feature, at least in part, analyzing the ancillary pharmacy/medical costs for physician for a specific health-care practice and identifying each specific physician of the health-care practice having ancillary pharmacy/medical costs that are a predetermined percentage greater than average per physician for the specific health-care practice. Further, even if generally calculating averages and identifying entities is well-known in the art of statistical profiling, as premised by the Examiner, application to physicians in a healthcare practice participating in an insurance network, with respect to ancillary medical or pharmacy costs, is not. *See, e.g.*, Exhibit 1, para. 5e13. This was clearly pointed out in the prior office action response.

Regarding Claims 4 and 16, neither Snail nor Leet disclose, teach, or suggest selecting a physician having the highest ancillary pharmacy (or medical) costs within the healthcare practice, as featured in the claims. *See, e.g.*, Exhibit 1, para. 5e14. Although the Examiner cites Snail, page 156, as indicated in the previous office action response, Applicants were unable to find any teaching or suggestion directed to such feature(s).

Regarding Claims 5 and 17, neither Snail nor Leet disclose, teach, or suggest educating the at least one physician on the benefits of alternative ancillary medical procedures or prescription medications using research literature for comparing the alternative ancillary medical procedures or medications to the current ancillary medical procedures or the prescribed medications, respectively, and organizing continued medical education classes to educate each of the plurality of physicians in the healthcare practice on the benefits of the alternative ancillary medical procedures or prescription medications, as featured in the claims. *See, e.g.*, Exhibit 1, para. 5e15. Although the Leet algorithm arguably provides a physician a recommended drug treatment according to a ranked selection, col. 14, lines 26-30, the algorithm does not provide continued medical education classes to educate each of a plurality of physicians in a healthcare practice on the benefits of the alternative insurance-network sponsored ancillary medical procedures or prescription medications. Leet, therefore, fails to disclose, teach, or suggest this missing feature. As such, such missing feature can not be incorporated into Snail through

combination with Leet, as premised by the Examiner, to somehow produce Applicants' claimed invention. *See, e.g.*, Exhibit 1, para. 5e15.

Regarding Claims 6 and 18, neither Snail nor Leet, alone or in combination, disclose, teach, or suggest preparing a list of ancillary medical procedures or prescription medications, that at least one physician may prescribe or engage in, that enable a physician to receive the predetermined reimbursement amount for the ancillary medical or pharmacy costs, as featured in the claims. *See, e.g.*, Exhibit 1, para. 5e16. Although the Leet algorithm arguably provides a physician a recommended drug treatment according to a ranked selection, col. 14, lines 26-30, the ranking formula does not include a "predetermined reimbursement amount for ancillary pharmacy [or medical] costs" as part of its ranking criteria. *See* Leet, col. 23, lines 7-37. Leet, therefore, fails to disclose, teach, or suggest this missing feature. As such, such missing feature can not be incorporated into Snail, through combination with Leet, as premised by the Examiner, to somehow produce Applicants' claimed invention. *See, e.g.*, Exhibit 1, para. 5e16.

Regarding Claims 7 and 19, neither Snail nor Leet, alone or in combination, disclose, teach, or suggest providing custom prescription medication or medical procedure forms that include the list of prescription medications or ancillary medical procedures, respectively, that at least one physician may prescribe or engage in that enable the at least one physician to receive the predetermined reimbursement amount for the ancillary pharmacy or medical costs. *See, e.g.*, Exhibit 1, para. 5e17. Leet discloses database information in a *closed* system database accessible using a diagnosis code (entered into a hospital record) organized into a record shown in Table III. *See* Leet, col. 10, lines 24-28 and col. 18, lines 34-40. Even if this table were considered a custom prescription or medical procedure *form*, which Applicants contend it is not, none of the Table III elements include a predetermined reimbursement amount nor such indication of reimbursement related to some drugs but not others. Leet, therefore, fails to disclose, teach, or suggest this missing feature. As such, such missing feature can not be incorporated into Snail, through combination with Leet, as premised by the Examiner, to somehow produce Applicants' claimed invention. *See, e.g.*, Exhibit 1, para. 5e17.

Regarding Claims 8, 20, and 24, neither Snail nor Leet, alone or in combination, disclose, teach, or suggest preparing a list of common ancillary medical procedures or prescription medications that are approved by each of the plurality of insurance networks so as to enable at

least one physician to receive the predetermined reimbursement amount for the ancillary pharmacy or medical costs. *See, e.g.*, Exhibit 1, para. 5e18. That is, although Leet arguably discloses providing a list of suggested medications and associated costs, Leet (and Snail) not only say nothing of having a relationship to multiple insurance networks, clearly neither indicates a list of prescription medications or ancillary medical procedures common to such non-disclosed plurality of insurance networks, as is featured in the claims. Leet, therefore, fails to disclose, teach, or suggest this missing feature. As such, such missing feature can not be incorporated into Snail through combination with Leet, as premised by the Examiner, to somehow produce Applicants' claimed invention.

Regarding Claims 10 and 21, neither Snail nor Leet, alone or in combination, disclose, teach, or suggest identifying at least one patient whose present prescription medications (or ancillary medical procedures) put the at least one physician at risk for not receiving the predetermined reimbursements for the ancillary pharmacy (or medical) costs, amending the at least one patient's present prescription medications (or ancillary medical procedures) to decrease the at least one physician's risk of not receiving the predetermined reimbursements for the ancillary pharmacy (or medical) costs, and particularly, discontinuing the at least one patient's present prescription medications (or ancillary medical procedures) that put the at least one physician at risk for not receiving the predetermined reimbursements for the ancillary pharmacy (or medical) costs. *See, e.g.*, Exhibit 1, para. 5e19. Although Leet discloses modifying the previously described drug protocol by eliminating drugs that are poorly tolerated by the community patient population or found to have an adequate *clinical effect* (col. 19, lines 30-34), this entirely *clinical criteria* does not include a physician's "business" risk of not receiving a predetermined reimbursement for ancillary pharmacy (or medical) costs, as featured in the claims. Leet, therefore, fails to disclose, teach, or suggest this missing feature. As such, such missing feature can not be incorporated into Snail through combination with Leet, as premised by the Examiner, to somehow produce Applicants' claimed invention. *See, e.g.*, Exhibit 1, para. 5e19.

Regarding Claims 11 and 22, neither Snail nor Leet, alone or in combination, nor the Examiner's official notice, disclose, teach, or suggest a physician providing a combination of *both* a first letter informing the pharmacy (or ancillary medical facility) that the at least one

patient's present prescription medication (or ancillary medical procedures) is discontinued *and* the second letter informing the at least one patient that the patient's present prescription medication (or ancillary medical procedures) is discontinued, as featured in the claims. *See, e.g.*, Exhibit 1, para. 5e20. This was clearly pointed out in the prior office action response. Nor does the Examiner specifically take Official Notice to such effect. Rather, only in the Examiner's conclusion does the Examiner assert that such combination feature would be obvious to one of ordinary skill in the art. Such combination, however, would not be obvious, as suggested by the Examiner. *Id.* Such dual-letter processing can advantageously have the effect of enhancing communication and management, and ensuring each affected member is properly updated.

Regarding Claims 12 and 23, neither Snail nor Leet, alone or in combination, disclose, teach, or suggest updating each of a plurality of physicians in a healthcare practice of any changes in the management of ancillary pharmacy or medical costs from the insurance network, respectively, as featured in the claims. *See, e.g.*, Exhibit 1, para. 5e21. First, as noted previously, neither Snail nor Leet teach or suggest procedures involving ancillary medical or pharmacy costs from an *insurance network.* Further, nowhere in the Snail definition of "profiles" are any costs, or specifically, ancillary pharmacy or medical costs as defined in the claims, mentioned as a measured component for its "selective contracting." Therefore, it is evident that the term "profiles" is used by Snail in a manner for contract management and not in a manner for ancillary cost management or updating physicians of changes in their individual costs relative to their peers. *See, e.g.*, Exhibit 1, para. 5e21. Such feature, therefore, would not be obvious to one of ordinary skill in the art at the time of the invention.

Regarding Independent Claim 25, as described previously primarily with respect to Claim 1, neither Snail nor Leet, alone or in combination, disclose, teach, or suggest the gathering, identifying, or modifying management behavior steps. Further, neither Snail nor Leet, alone or in combination, disclose, teach, or suggest providing a financial incentive to both an insurance network *and* a plurality of physicians in the healthcare practice participating in an insurance network to modify the plurality of physicians' management behavior of ancillary medical costs that are not as profitable to the insurance network. *See, e.g.*, Exhibit 1, para. 5e22. As stated previously, neither Snail nor Leet teach behavior management through ancillary medical cost reimbursements. *See* Snail page 156 and 161. Further, neither Snail nor Leet are directed to a

healthcare practice participating in an insurance network. Both are directed to implementation within a closed system, e.g., hospital environment. Therefore, in accordance with the above discussion, Claim 25 has been shown to be novel and nonobvious and define over the cited documents.

Regarding Independent System Claims 37 and 46, neither Snail nor Leet, alone or in combination, disclose, teach, or suggest at least the following: a first database comprising ancillary medical procedures that are preferred by the insurance network; a second database comprising ancillary medical costs of each of the plurality of physicians participating in the insurance network; an analyzer for analyzing the data in the first and second database and comparing the ancillary medical procedures that are preferred by the insurance network with the ancillary medical costs of the plurality of physicians participating in the insurance network to thereby identify ancillary medical costs of the physicians that are not preferred by the insurance network; and managing means responsive to the analyzer for managing the ancillary medical costs of the healthcare practice identified as not being preferred by the insurance network to thereby modify the ancillary medical costs of the physicians in the healthcare practice to be more profitable to the insurance network. *See, e.g.*, Exhibit 1, para. 5e23. Particularly, as indicated in the prior office action response, Applicants were unable to identify any passage in either Snail or Leet indicating a teaching or suggestion with respect to providing at least the following: an analyzer to compare ancillary medical procedures preferred by an insurance network with ancillary medical costs of physicians in a healthcare practice participating in the insurance network to identify those non-preferred ancillary medical costs being incurred, or managing those ancillary medical costs identified as not being preferred by an insurance network. These are important features correspondingly not disclosed, taught, or suggested by either Snail or Leet, or the combination thereof. *See, e.g.*, Exhibit 1, para. 5e23. As such, Claims 37 and 46 have been shown to be allowable and define over the cited documents.

The dependent Claims 39-45, and 51-56 have also been shown to be allowable because their corresponding independent claims, Claims 37 and 46, respectively, have been shown to be novel and non-obvious. Nevertheless, the dependent claims include independent novelty and are also nonobvious. For example, neither Snail nor Leet, alone or in combination, disclose, teach, or suggest a calculating means for calculating an average ancillary medical cost per physician for

the healthcare practice, etc., as featured in Claims 39 and 51; an educator as featured in Claims 40 and 52; custom medical procedure forms including ancillary medical procedures that are preferred by the insurance network, as featured in Claims 41 and 53; patient intervening means as featured in Claims 42 and 54; generating means for generating letters to both a medical facility and a patient providing notification of a change in ancillary medical procedures, as featured in Claims 43 and 55; and an updater for updating physicians in the healthcare practice of any changes in the management of ancillary medical costs, as featured in Claim 44 and 45, nor has the Examiner generally asserted as such, other than to state, and paraphrase, that such claims are rejected for "similar reasons as given above" with respect to method Claims 12-24.

In commenting upon the references and in order to facilitate a better understanding of the differences that are expressed in the claims, certain details of distinction between the cited documents and the claimed embodiments of the invention have been mentioned, even though such differences do not appear in all of the claims. It is not intended by mentioning any such unclaimed distinctions to create any implied limitations in the claims. Not all of the distinctions between the cited documents and Applicants' claimed embodiments of the invention have been made by Applicants. For the foregoing reasons, Applicants reserve the right to submit additional evidence showing the distinctions between Applicants claimed embodiments to be nonobvious in view of the cited references.

The foregoing remarks, made without prejudice as to patentability, including the doctrine of equivalents, are intended to assist the Examiner in re-examining the application and in the course of explanation may employ shortened or more specific or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims; the actual claim language should be considered in each case. Furthermore, the remarks are not to be considered to be exhaustive of the facets of the claimed embodiments of the invention that render it patentable, being only examples of certain advantageous features and differences that Applicants' attorney chooses to mention at this time.

CONCLUSION

In view of the above remarks, Applicants submit that the Application is in condition for allowance. As such, the issuance of a Notice of Allowance is respectfully requested.

Respectfully submitted,

Date: 3-19-07

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The Effects of Hospital Contracting for Physician Services on Hospital Performance

by

Timothy Scott Snail

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Abstract

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Doctor of Philosophy in Health Services and Policy Analysis

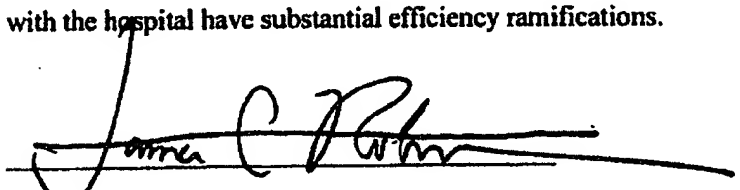
University of California, Berkeley

Professor James C. Robinson, Chair

This dissertation examines fundamental change in hospital contracting for physician services in the 1990s by: (1) comparing the primary organizational alternatives, and (2) evaluating their effects on hospital financial performance. Financial performance reflects trade-offs in efficiencies and economic coordination costs when firms switch between contractual networks and vertical integration.

The rapid shift from cost-plus reimbursement of health care providers under fee-for-service insurance to prospectively-priced managed care systems in recent years has stimulated price competition and innovation. Third-party payers increasingly bargain with organized systems of physicians and hospitals to establish bundled pricing for physician and hospital services and financial risk-sharing agreements. Physicians are rarely hospital employees but control most resource utilization decisions. Reducing hospital costs without sacrificing quality necessitates improved alignment of economic incentives between physicians and hospitals. In this new environment, hospitals enter into long-term contracts with or acquire physician practices instead of procuring services on the spot market, but the hospital performance implications are unknown.

This dissertation uses transaction cost economics and principal-agent theory to explain the economic motivation for hospital contracting for physician services. The contractual alternatives involve trade-offs in coordination costs and efficiency gains that vary under different market conditions. The team structure of group practices and vertical integration are viewed as means of protecting specialized investments in cost-effective physician practice patterns. Contracting with integrated physician practices requires the greatest specialized investments, which are hypothesized to improve success in obtaining stringent managed care contracts and controlling hospital costs. Results from discrete choice and cost function econometric models strongly support these hypotheses. Integrated physician practices improve hospital success in obtaining managed care contracts that involved high degrees of financial risk sharing, while network practices improved success with low risk-sharing contracts. Only contracting with integrated practices reduced hospital cost growth in the face of demand for stringent cost and quality control. This study has important implications for antitrust policy on hospital entry into the physician services market, which now involves weighing efficiencies versus anticompetitive effects. The form of physician practice and its contractual relationship with the hospital have substantial efficiency ramifications.



Chair

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I am grateful to Jamie Robinson for his mentorship and support, and for providing me with a wealth of opportunities in research and teaching throughout my years at Berkeley. Paul Gertler not only helped bring my empirical work into focus, but was an enthusiastic supporter of my research and teaching. Steve Shortell offered many valuable insights into hospital organization that have greatly aided my research. Oliver Williamson had a profound influence on my education and intellectual development. From my first course with him upon arriving at Berkeley, it was clear why he is held in such high regard for his standards of scholarship and collegiality. I have benefitted enormously from his thoughtful comments and advice, not to mention his insistence that I be "relentlessly comparative."

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Third, I wish to thank my family and friends. It is hard to imagine how I could have completed my dissertation without their unwavering support. Special thanks are in order for John Schneider, Patrick Moreton, Bennet Zelner, and Betsy Vick for being on the front lines during this exciting and demanding time in my life. Our adventures in the Sierra and at sail in San Francisco bay are some of my fondest memories of Berkeley.

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CHAPTER 1: INTRODUCTION

This dissertation examines the trade-offs in efficiencies and economic coordination costs that occur when firms switch between market contracts and vertical integration. The central themes are (1) the comparison of organizational alternatives, and (2) evaluation of the financial performance implications arising from the varying capacities of different forms of organization to adapt to changing market conditions. In particular, transaction cost economics and principal-agent theory are used to explain fundamental change in hospital contracting for physician services in the 1990s.

Chapter 2 traces the rise of managed care systems as a response to demand for cost containment and improved coordination of health care delivery. Declining returns to cost control initiatives of the 1980s have compelled hospitals to develop close relationships with physician practices through long-term contracts or unified ownership of physician practices. The three transactions of interest to this dissertation are identified (i.e., development of hospital-physician supplier networks, hospital-physician supplier network's pursuit of managed care contracts, and coordination of hospital and physician services to contain hospital costs), and the structure of the market for hospital services is described. These transactions have a natural sequence: hospitals and physicians form supplier networks to seek managed care contracts, and once they obtain contracts they attempt to care for the covered patients in a cost-effective manner.

Each of the three following chapters investigates one of the transactions by discussing its essential characteristics, the alternative organizational forms for governing the transaction, the economic motivation for choosing amongst governance structures and the

hypothesized behavior, the data and predicted coefficients of variables, the empirical specification and econometric methods, and the empirical results.

Chapter 3 develops the economic motivation for hospital choice of physician practice organizations in forming hospital-physician supplier networks, which are subsequently used to seek managed care contracts and coordinate hospital and physician services. Transaction cost economics theory is used as an analytic framework. The organizational choice has two components: (1) the type of physician practice organization (i.e., network or integrated firm), and (2) the contractual relationship between the hospital and physician practice (i.e., long-term contract or unified ownership). The focus of this chapter is on the first component. The hospital's financial performance depends on the ability of physician practice organizations to instill performance incentives and adapt to changing market conditions. This chapter identifies the generic organizational alternatives (i.e., spot market, network, integrated firm), the distinguishing characteristics of physician practice organizations, and the specialized financial and intellectual capital investments required to attain high levels of hospital cost containment and quality control. The chapter empirically tests hypotheses about the hospital's choice of physician practice organization under different levels of investment in these specialized assets, although limitations in available data necessitate the use of more aggregate measures than is characteristic of empirical research in transaction cost economics. The findings of panel data models of hospital contracting for physician services from 1993 to 1996 strongly support the predictions. Hospitals use less capital-intensive forms of physician practice organization as hospital competition abates, and hospitals choose network over integrated physician practice firms as market-level investment in cost and quality control

rises. The analytic framework, which relates the hospital's organizational choices to hospital financial performance, is augmented and empirically tested in Chapters 4 and 5.

Chapter 4 investigates the first of two performance implications of the hospital's development of hospital-physician supplier networks, namely the network's success in obtaining managed care contracts. Transaction cost economics and principal-agent theory are used to develop an analytic framework. Managed care contracts (i.e., PPO, HMO, capitated HMO) differ most importantly in the degree of financial risk shared between the health plan and supplier network. Hospital-physician supplier networks also differ in their ability to manage financial risk by virtue of their physician practice organizational form (e.g., PHO, IPA) and its relationship to the hospital (i.e., long-term contract, unified ownership). This chapter empirically tests hypotheses about the ability of specific forms of hospital-physician supplier networks to obtain specific types of managed care contracts, and to provide additional patients for the hospital. The findings of panel data models of hospital-physician network success in obtaining managed care contracts from 1993 to 1996 strongly support the predictions. Network physician practice organizations are more successful in obtaining low risk-sharing managed care contracts, while integrated firms are more successful in obtaining high risk-sharing contracts. Hospitals that structure their relationships with physician practices through unified ownership are more successful in obtaining low risk-sharing managed care contracts, but less successful in obtaining high risk-sharing contracts.

Chapter 5 examines the effects of hospital development of hospital-physician supplier networks on hospital cost growth. Transaction cost economics and principal-agent theory are used to develop an analytic framework. Hospital-physician supplier networks differ

in their ability to control hospital costs and quality by virtue of their physician practice organizational form (e.g., PHO, IPA) and its relationship to the hospital (i.e., long-term contract, unified ownership). This chapter empirically tests hypotheses about the ability of specific forms of hospital-physician supplier networks to control hospital cost growth. The findings of panel data models of hospital-physician network success in containing hospital costs from 1993 to 1996 strongly support the predictions. Network physician practice organizations are less successful in controlling total hospital costs than integrated firms. Hospitals that structure their relationships with physician practices through unified ownership are less successful in controlling total hospital costs than those structured through long-term contracts. This chapter also investigates the effects of hospital contracting for physician services on the components of hospital costs including volume (i.e., patient discharges), intensity (i.e., patient average length of stay), and average cost per day. While network physician practice organizations better control intensity of service in the hospital, their average cost per hospital day is higher than that of integrated firms.

Chapter 6 concludes with a discussion of the main empirical results and policy implications in three areas: (1) contracting for physician services and hospital production, (2) coordination costs versus efficiency gains, and (3) antitrust policy implications.

Appendix 1 describes the data sources used in the empirical analyses, how variables were constructed, and the definition of markets.

Appendix 2 discusses the four principal governance mechanisms in physician practice organizations: selective contracting, payment mechanisms and performance incentive, utilization management and monitoring, and physician participation in governance.

Available data do not permit hypothesis testing based on these specific mechanisms, although the principal forms of hospital-physician supplier networks identified in Chapter 3 represent discrete structural combinations of these fundamental mechanisms.

Appendix 3 describes typical provisions of managed care contracts.

CHAPTER 2: HOSPITAL MARKET EVOLUTION

Adaptation is the central problem of economic organization.[1] A firm's financial performance is not only the result of its internal performance incentives and administrative controls, but of how successfully the firm adapts to constantly changing market conditions. This chapter explains the fundamental change in hospital markets arising from increased use of managed care systems, the principal transactions involving hospitals and physicians under managed care, and the characteristics of the market for hospital services. Subsequent chapters explore the main factors affecting hospital performance incentives and administrative controls and compare hospital financial performance under the principal discrete structural alternatives for procuring physician services.

1. THE RISE OF MANAGED CARE

Hospital and physician firms in the United States have become increasingly interdependent over the past two decades as a result of fundamental changes in how they are paid for their services. Substantial increases in health care costs during the 1980s caused large institutional purchasers of health care (i.e., private employers and government health care programs) to seek more effective means of controlling health care expenditures. The result of these efforts has been a rapid shift from unmanaged, retrospective fee-for-service (FFS) reimbursement of health care providers to managed

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[1]Chester Barnard, The Functions of the Executive, 1938; Oliver E. Williamson, Comparative Economic Organization: The Analysis of Discrete Structural Alternatives, 36 Admin. Sci. Q. 2 (1991).

care[2] systems. This shift, which began in the mid-1980s and accelerated in the 1990s, has stimulated price competition and innovation in the health care sector. Prior to the 1980s, the hospital and physician services industries were characterized by nonprice competition. Hospital capacity and rate regulation in the 1970s reduced the ability of firms to use price as an instrument through which to compete.[3] Furthermore, most consumers were insensitive to price since they received health care through fee-for-service insurance plans with generous cost-plus reimbursement formulas for hospital and physician health care providers, open-ended choice of providers, and minimal out-of-pocket expenditures by consumers.[4] Comparative information about alternative providers was difficult to obtain and evaluate, and consumers' choices often reflected the decisions of their physicians, who did not bear the costs associated with their preferences for expensive hospital equipment and highly skilled support staff. Hospitals[5] competed for patients by affiliating

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[2]"Managed care" describes health plans that use financial incentives or administrative mechanisms to motivate physicians to control health care utilization and quality. Health plans provide managed care health insurance mainly through preferred provider organizations (PPOs) and health maintenance organizations (HMOs). Under fee-for-service arrangements, providers are typically paid by the health plan on the basis of a fee schedule or at the "usual, customary, and reasonable" (UCR) fee level for the market. In this form, FFS is often called unmanaged third-party indemnity insurance. PPOs contract with providers who agree to accept a discounted percentage of their UCR fees (typically 80 percent) and various utilization management procedures (e.g., precertification of expensive procedures). HMOs collect more detailed data on physician practice than PPOs, use more stringent payment and utilization management methods, and are generally more selective in choosing providers. PPO networks typically cover more providers than those of HMOs.

[3]Alain C. Enthoven, The U.S. Health Care Economy: from Guild to Market in Ten Years, 7 Health Policy 2 (1987); John E. Schneider, Economic Analysis of Regulation and Regulatory Reform in the U.S. Hospital Industry, 1980-1996, unpublished doctoral dissertation (1999).

[4]Unlike most consumer products, health care consumers rarely pay the full price at the time they receive services. Furthermore, the price paid to a health care provider for a particular service often differs depending upon the patient's source of health insurance, and payment typically involves a different set of economic agents than service delivery.

[5]Individual hospitals may horizontally integrate by joining multi-hospital systems, although the economic motivation for affiliation with physicians is similar for hospitals and hospital systems. In this study the term "hospitals" will be used to imply both hospitals and hospital systems except when the multi-firm character of hospital systems must be distinguished from that of individual hospitals.

with physicians who controlled patient referrals to the hospital, by acquiring specialized facilities, hiring additional staff, and improving quality of care and patient amenities rather than by minimizing costs. Several studies found that the most competitive hospital markets during this period of nonprice competition had the highest costs and staffing levels.[6,7]

By the early 1980s, a combination of federal and state legislation, court rulings, and the declining influence of the American Medical Association allowed health plans to start selectively contracting with providers, a routine practice in most other industries.[8] Also, public and private sector initiatives began to change the way health insurance plans paid for hospital services. New payment systems were implemented to give hospitals a strong incentive to control patient volume and cost per admission to the hospital. In 1983, the federal government replaced Medicare's cost-based reimbursement system with a prospective payment system (PPS) that pays hospitals a fixed rate per patient stay, based on the diagnosis. Through statutory limits on payments for hospital inpatient stays, PPS created strong incentives for hospitals to treat patients in less resource-intensive and less costly outpatient settings in cases where inpatient and outpatient care are technological

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[6]James C. Robinson & Harold S. Luft, The Impact of Hospital Market Structure on Patient Volume, Average Length of Stay, and the Cost of Care, 4 J. Health Econ. 4 (1985); Harold S. Luft, S. C. Maerki, & J. B. Trauner, The Competitive Effects of Health Maintenance Organizations: Another Look at the Evidence from Hawaii, Rochester, and Minneapolis/St. Paul, 10 J. Health Politics Policy Law 4 (1986); James C. Robinson, D. W. Garnick, & S. J. McPhee, Market and Regulatory Influences on the Availability of Coronary Angioplasty and Bypass Surgery in U.S. Hospitals, 317 New Eng. J. Med. 2 (1987); James C. Robinson & Harold S. Luft, Competition and the Cost of Hospital Care, 1972 to 1982, 257 J. Amer. Med. Assn. 23 (1987); James C. Robinson , Harold S. Luft , S. J. McPhee, S. S. Hunt, Hospital Competition and Surgical Length of Stay, 259 J. Amer. Med. Assn. 5 (1988).

[7]This type of cost-increasing nonprice competition also occurred in the airline industry prior to deregulation.

[8]Enthoven, *supra* note 3.

substitutes. This new payment system affected over one-quarter of all hospital admissions per year,[9] and its effects have been the subject of many empirical studies.[10] At nearly the same time private employers, who provide insurance for nearly two-thirds of the non-elderly population,[11] began to restructure their health benefit packages to encourage employees to join preferred provider organizations (PPOs) or health maintenance organizations (HMOs) instead of more costly fee-for-service plans. PPOs and HMOs selectively contract with hospitals based on their quality and price, and they typically negotiate payment formulas that require providers to assume a significant portion of the financial risk associated with the delivery of hospital care.[12] Public and private sector cost control initiatives in the 1980s caused significant changes in the production of hospital services. Hospitalization rates and length of patient stays in the hospital declined substantially, and many services (e.g., the least intensive surgical procedures) were rapidly shifted out of the hospital and into outpatient settings.[13] In the second half of the 1980s, hospital costs declined on both a per patient stay and per day basis, while the average length of patient stays in the hospital leveled off (Table 2.1).[14]

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[9]U.S. Health Care Financing Administration, Health Care Financing Trends: Medicare Utilization, 5 Health Care Fin. Rev. 4 (1984).

[10]C. R. Fisher, Hospital and Medicare Financial Performance under PPS: 1985-90, 14 Health Care Fin. Rev. 1 (1992).

[11]Employee Benefits Research Institute, Sources of Health Insurance and Characteristics of the Uninsured, EBRI Issue Brief, 1996.

[12]D. L. Scammon & D. A. Fuller,"The Management of Upstream and Downstream Risk Through Selective Contracting, 5 J. Amb. Care Market. 1 (1992).

[13]In California hospitals between 1983 and 1993, expenditures grew 44 percent less rapidly in markets with high HMO penetration than in markets with low HMO penetration. Of this, 28 percent was due to reduction in the volume and mix of services, 6 percent to reductions in bed capacity, and 10 percent to changes in the intensity of services provided. See James C. Robinson, Decline in Hospital Utilization and Cost Inflation Under Managed Care in California, 276 J. Amer. Med. Assoc. 13 (1996).

[14]Cost control initiatives of the 1980s affected not only the volume and intensity of services, but also the average cost of hospital services (e.g., due to lower wage rates). PPS contributed to a 5 to 7 percent

Table 2.1: Volume, Intensity,[b] and Cost of Hospital Care, 1980-95[a]

Hospital care	1980	1985	1990	1995	% change 1980-85	% change 1985-90	% change 1990-95
Volume and Intensity							
Inpatient admissions per 1,000 population	168	148	124	118	-.119	-.162	-.048
Average inpatient length of stay (days)	7.3	6.5	6.4	5.4	-.109	-.015	-.156
Hosp. outpatient surgery (% of all surgery)	.164	.345	.506	.576	1.103	.466	.138
Cost							
CPI-adjusted hospital cost per stay ($)	1844	1931	1917	2480	.047	-.007	.294
CPI-adjusted hospital cost per day ($)	244	274	265	260	.121	-.033	-.021

[a] Source: American Hospital Association, *Hospital Statistics* (annual); U.S. National Center for Health Statistics, National Hospital Discharge Survey, in *Vital and Health Statistics*, series 13 (annual); Hospital and related services Consumer Price Index (CPI) from the Bureau of Labor Statistics (annual).
[b] Intensity refers to average hospital inpatient length of stay.

In the early 1990s, the trend toward increased use of managed care systems accelerated. Hospital costs per patient stay increased substantially (Table 2.1) in part due to success in reducing the volume and intensity (i.e., average length of stay) of hospital care. While hospitalization rates continued to decline, the patients remaining in the hospital were the most severely ill and required more resource-intensive and costly care than the average patient in prior periods. As the potential for further gains in cost containment from these relatively easily implemented measures declined, hospitals began to use new means of contracting for physician services to improve coordination of health care services within the hospital and between inpatient and outpatient settings.

The shift toward managed care systems has produced two striking changes in the structure of the health care industry. First, in contrast to spot market procurement under FFS insurance,[15] managed care health plans seek long-term contractual relationships with

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decline in the growth of hospital expenditures per discharge; Fisher, *supra* note 10.

[15]Physicians often have privileges to admit patients to more than one hospital in a market. FFS insurance does not compel physicians to use a particular hospital, although managed care plans often require physicians to admit patients to specific hospitals. Thus, under FFS insurance health plan-provider and hospital-physician relationships can be characterized primarily as spot market procurement or, at times,

organized systems of physicians, hospitals, and other health care providers to better control the cost and quality of health care.[16] This shift toward managed care systems is reflected in increased bargaining on price between third-party payers and organized systems of providers, and in financial risk-sharing arrangements and bundled payments for physician and hospital services.

The second striking development is the substantial increase in hospital contracting for physician services. In this study, "contracting" refers to formal arrangements between firms to coordinate production through long-term relational contracts or unified ownership, as distinct from arms-length spot market procurement.[17] Before the widespread expansion of managed care, the extent of integration between hospital and physician firms was minimal. Hospitals are increasingly establishing long-term contracts with or acquiring physician practices instead of procuring physician services on the spot market, and they usually establish new corporate entities to administer these contracts.[18] Physicians are rarely employees of hospitals because of the unique institutional history of hospitals and physician practice[19] and due to legal prohibitions in many states. Yet

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informal coordination without unified ownership. The distinctions between formal and informal organization are discussed in Oliver E. Williamson, Chester Barnard and the Incipient Science of Organization, in Organization Theory: From Chester Barnard to the Present and Beyond, 1990.

[16]Keith M. Korenchuk & Joy M. Hord, Managed Care Plans and the Organizational Arrangements with Group Practices, 19 J. Amb. Care Mgmt. 4 (1996).

[17]In economic theory, the term "contract" encompasses unified ownership (or "hierarchy"), long-term relational contracts, and spot market procurement. For purposes of brevity, this study defines "contracting" as exchange through unified ownership or long-term contract.

[18]In other studies and in legal and regulatory actions, hospital contracting for physician services has been called physician-hospital integration, integrated delivery systems, physician-hospital organizational arrangements (POAs), hospital organization of physician services, or physician network development. The customary forms of hospital contracting for physician services are discussed in Timothy S. Snail and James C. Robinson, Organizational Diversification in the American Hospital, 19 Annual Rev. Public Health (1998) and later in this chapter.

[19]Paul Starr, The Social Transformation of American Medicine, 1982. Rosemary Stevens, In Sickness and in Wealth: American Hospitals in the Twentieth Century, 1989.

because only physicians have the statutory authority to admit and discharge hospital patients and order diagnostic tests, their practice patterns directly influence 80 to 90 percent of hospital resource allocation decisions.[20] Reducing cost growth through more efficient joint production without sacrificing health care quality necessitates improved coordination of production and better alignment of economic incentives between physician practices[21] and hospitals.

2. Hospital-Physician Transactions

The provision of hospital services under managed care involves three principal transactions that occur *in seriatum*:

2.1. Establish a Hospital-Physician Supplier Network

In the hospital-physician supplier network transaction, a hospital builds a supplier network by evaluating physician practice firms as potential business partners and choosing a hospital-physician organizational form for managed care contracting.[22] The organizational choice has two components: the type of physician practice organization (i.e., a network or integrated firm[23]) and the contractual relationship between the hospital and physician practice (i.e., long-term contract or unified ownership). For a particular hospital, the type of physician practice organization is the primary determinant of both the

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[20]John M. Eisenberg, Physician Utilization: The State of Research About Physicians' Practice Patterns, 23 Med. Care 5 (1985).

[21]A physician practice is a firm that employs physicians or contracts for their services. In this study, the term "physician practice" means any form of physician organization including solo practice, physician-hospital organization (PHO), independent practice organization (IPA), and group practice, as described later in this chapter.

[22]Chapter 3 focuses on the *ex ante* issues in the development of the hospital-physician supplier network. The *ex post* governance consequences of the network are the focus of Chapters 4 and 5.

[23]Network and integrated firms are defined in Chapter 3, Section 3.1.

supplier network's reputation for cost containment and quality control, and the financial and intellectual capital required for the organizational form. Network forms of physician practice organization require less capital to start up and expand than integrated firms, but integrated firms are able to implement more stringent cost controls. Differing cost containment, quality control, and financial capital attributes make each organizational alternative the economizing choice for a different set of market conditions. Once the hospital-physician supplier network is established, it can seek managed care contracts from health plans. This transaction is examined in Chapter 3, Supplier Networks and Choice of Hospital-Physician Organizational Form.

2.2. Seek Managed Care Contracts

To gain access to large pools of potential patients, hospital-physician supplier networks seek managed care contracts with health plans, which act as the buyer's agent. For the hospital-physician supplier network, managed care contracts differ most importantly in the degree of financial risk shared between the health plan and supplier network (e.g., PPO contracts involve minimal risk-sharing, capitated HMO contracts involve substantial risk-sharing). Hospital-physician supplier networks also differ in their ability to manage financial risk by virtue of their organizational form, which affects the supplier network's ability to control cost and quality of services and spread risk. Differing financial risk-bearing capabilities make of each hospital-physician organizational form the economizing choice for a particular type of managed care contract. The supplier network's success in obtaining managed care contracts affects the number of potential patients, and thus the number of patients admitted to the hospital.

This transaction is examined in Chapter 4, Risk Sharing and the Pursuit of Managed Care Contracts.

2.3. Coordinate Hospital and Physician Services

Hospitals build hospital-physician supplier networks not only to obtain managed care contracts, but to control the cost and quality of health care services delivered to patients covered by these contracts. Hospitals control costs primarily by selectively contracting with cost-effective physician practices and improving coordination of the delivery of hospital and physician services. Cost control capabilities are influenced by the key dimensions of hospital-physician supplier networks: the type of physician practice organization (i.e., a network or integrated firm) and the contractual relationship between the hospital and physician practice (i.e., long-term contract or unified ownership). This transaction is examined in Chapter 5, Hospital-Physician Coordination and Hospital Cost Containment.

3. THE MARKET FOR HOSPITAL SERVICES

There is a well-developed theoretical literature on the industrial organization of the market for both hospital services[24] and physician services.[25] The salient features of these markets are the characteristics of buyers and sellers, entry conditions, and regulation.

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[24]David Dranove & William D. White, Recent Theory and Evidence on Competition in Hospital Markets, 3 J. Econ. Mgmt. Strat. 1 (1994).

[25]Martin Gaynor, Issues in the Industrial Organization of the Market for Physician Services, 3 J. Econ. & Mgmt. Strat. 1 (1994).

3.1. Characteristics of Buyers, Sellers, and Demand

The behavior of hospitals in contracting for physician services is influenced by the structure of hospitals, health plans, and the physician practices in the market.[26] Health plans act as agents for the buyer (e.g., large employers), negotiating managed care contracts for the purchase of hospital and physician services. Hospital market structure is often measured by the number of hospitals and the Herfindahl-Hirschman Index[27] (HHI) of market concentration of hospital inpatient admissions. The HHI incorporates information about the number of sellers and their market shares, where higher HHIs correspond to higher industry price-cost margins.[28]

Market-level variation in pricing depends primarily upon the quality of services and the ability of hospitals and physician practices to control costs, in addition to geography. Market -level demand for cost and quality control can be measured by characteristics of health plans and physician practices. A key measure of health plan market structure is HMO penetration – the percentage of the population in the market who are insured under HMO plans. While there is variation in the definition of HMOs across markets and in the stringency of selective contracting, utilization management and payment mechanisms employed, HMOs are generally considered to be far more stringent than PPOs and other

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[26]David Dranove, Carol J. Simon, & William D. White, Determinants of Managed Care Penetration, 17 J. Health Econ. (1998). These factors are frequently cited in studies of hospital-health plan bargaining, as is system membership. John M. Brooks, Avi Dor, & Herbert Wong, Hospital-Insurer Bargaining: An Empirical Investigation of Appendectomy Pricing, 16 J. Health Econ. 4 (1997); Glenn A. Melnick, Jack Zwanziger, Anil Bamezai, & Robert Pattison, The Effects of Market Structure and Bargaining Position on Hospital Prices, 11 J. Health Econ. 3 (1992).

[27]The HHI is the sum of squared market shares of all sellers in the market.

[28]When oligopolistic firms with homogeneous products engage in Cournot competition, firm market share is negatively related to its marginal cost. The HHI equals the weighted average of firms' price-cost margins in the Cournot solution up to a constant of proportionality, the market demand elasticity. See Keith Cowling & Michael Waterson, Price-Cost Margins and Market Structure, 43 Economica (1976).

forms of managed care. HMO penetration can be viewed as a measure of the maturity of the managed care market: markets with higher HMO penetration have had managed care activity longer, seen more experimentation with it, and have generally developed more stringent cost and quality control measures.[29]

The stringency of utilization management and strength of payment mechanisms for physicians can be measured by the extent to which physician services are paid on a capitated basis instead of on terms such as discounted or undiscounted fee-for-service. Of these alternatives, capitation shifts the most financial risk to physicians and imposes the most stringent performance incentives. Physicians and medical practices usually go through a slow and difficult learning process to coordinate care, manage risk, and adjust practices in ways that make their negotiated capitated payment rates profitable without endangering quality of care.[30] Physician practices generally do not pay physicians based on their performance until capitation becomes a substantial proportion of the practice's income,[31] and more mature managed care markets are generally able to sustain higher levels of capitation.

3.2. Market Structure

Table 2.2 reports the change in pertinent market conditions in metropolitan areas of the United States during the study period. The "Markets" column shows the number of market areas in each year. Each market area is divided into quartiles, and a variety of

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[29]Robert H. Miller, Health Systems Integration: A Means to an End,15 Health Affairs 2 (1996); Stephen M. Shortell et al, Remaking Health Care in America: Building Organized Delivery Systems (1996).

[30]Lawrence P. Casalino, Risky Business: Medical Groups and Full-Risk Capitation in California, 1998.

[31]A nationwide survey in 1997 found that approximately 48 percent of physicians' fee-for-service income and 45 percent of their capitation earnings were paid to them through flat or base salaries. See Ken Terry, How Doctors Divide Income, 75 Med. Econ. 19 (1998).

statistics are reported for these major market segments. The reported statistics are the values (i.e., the "Centile") at the interior boundaries of the quartiles (i.e., the 25th, 50th and 75th percentiles); for example, there are five firms at the 75th percentile for the number of HMOs. Reported market-level statistics include the number of HMOs, number of hospitals, the Herfindahl-Hirschman Index of hospital admissions, the percentage of the population covered by HMO health plans (% HMO penetration), and the percentages of total health plan reimbursements to primary care and specialty care physicians that are paid on a capitated basis.

Table 2.2: HMO, Hospital, and Physician Services Market Structure, 1993-96[a]

		1993		1996	
Variable	Percentile	Markets	Centile	Markets	Centile
Buyers					
Number of HMOs	25	313	1	315	3
	50 (median)		3		5
	75		5		8
Sellers					
Number of hospitals	25	731	1	709	1
	50 (median)		2		2
	75		4		3
Herfindahl-Hirschman Index of admissions	25	731	3,166	709	3,282
	50 (median)		5,142		5,169
	75		10,000		10,000
Market-Level Demand Characteristics					
% HMO penetration	25	313	.032	315	.075
	50 (median)		.111		.164
	75		.207		.280
% Primary care reimbursement capitated	25	313	.242	315	.355
	50 (median)		.450		.492
	75		.645		.644
% Specialty care reimbursement capitated	25	313	0	315	.066
	50 (median)		.082		.164
	75		.220		.283

[a] Hospital markets are counties; markets for physician services and HMOs are MSAs. Data (and market definition) are from the study sample, which is described in Appendix 1.

While there was continuing consolidation of the largest health plans during this period, the number of HMOs grew in every segment of the market. This growth is most likely due to expansion of HMOs into broader geographic markets as they introduce new product lines,[32] which has outstripped the countervailing effects of consolidation. The number of HMOs in the market, a measure of HMO competition, increased over the period.

Consolidation and closure further reduced the number of hospitals in the most concentrated markets, and in half of the markets hospitals had one or no competitors. The vast majority of hospital markets are already at levels far more concentrated than the thresholds that typically invoke merger-related antitrust scrutiny by the Department of Justice Antitrust Division and the Federal Trade Commission,[33] but there was little change in the HHI of hospital admissions for markets over the study period.

The degree of HMO penetration increased across the board during the study period, with larger increases occurring in markets with lower initial degrees of HMO penetration. The median market HMO penetration grew from 11.1 percent to 16.4 percent during the period. The main growth in capitation for primary care physician services occurred in markets with the least degree of capitation, signaling more rapid change in markets with the least stringent controls on primary care physician cost and quality. Capitation of specialists increased at all levels over the study period. The extent of capitation of primary care physicians (PCPs) is more than double that of specialists in every quartile,

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[32]Jon Gabel *et al*, Growing Diversification in HMOs, 1988-1994, 54 Med. Care Res. & Rev. 1 (1997); and Jon Gabel, Ten Ways HMOs Have Changed During the 1990s, 16 Health Aff. 3 (1997).

[33]Hospital mergers may be challenged if the pre-merger HHI is between 1,000 and 1,800 with a post-merger increase of 100 or more, or if the pre-merger HHI of at least 1,800 rises by 50 or more post-merger.

with the median market at nearly 50 percent PCP capitation in 1996 with a range of over 33 percent at the 25th percentile to nearly two-thirds at the 75th percentile.

3.3. Entry Conditions and Regulation

Hospitals can procure physician services through market contracts or unified ownership of physician practices. This does not involve establishing a new hospital, and rarely involves starting a new physician practice, but hospital-physician supplier networks often coordinate (via contract) or consolidate previously independent physician practices. Hospitals have several alternatives for structuring relationships with physician practices (see Chapter 3). Although typically few alternatives are prohibited by regulation in a particular market, compliance with regulatory requirements imposes substantial costs on hospitals in structuring relationships with physician practices. Thus, hospital contracting for physician services balances the costs of contracting (i.e., "entry") versus the ability to satisfy strategic objectives and cost and quality control. Entry (and exit) costs will be substantially higher if hospitals choose to purchase physician practices instead of obtaining services through market contracts.

Entry is also influenced by regulatory and licensing requirements,[34] minimum efficient scale considerations, and incumbency advantages.[35] State corporate practice of medicine[36] statutes prevent hospital-affiliated entities from directly employing physicians or exercising significant control over their practices. Hospitals may avoid regulatory

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[34]George W. Bodinger, Medical Practice Acquisitions – Legal and Business Issues, 9 Health Lawyer 4 (1997); Latham Williams, Provider Based Strategic Alliances, Bender's Health Care Law Monthly, Dec. (1996); Douglas A. Hastings, Physician-Hospital Integration: Beyond Contracting Models, Health Law Handbook, 1995.

[35]Jean Tirole, The Theory of Industrial Organization, 1988.

[36]Thirty-five states have these statutes, although some are not strictly enforced. See Frederick B. Abbey & K. Michael Treash Jr., Reasons Providers Form PHOs, 49 Healthcare Fin. Mgmt. 8 (1995).

challenges through market contracts for physician services or by establishing a separate medical foundation to oversee the relationship. State Any Willing Provider (AWP) statutes restrict the formation of closed physician panels by requiring that any willing physician who meets basic requirements be permitted to join the network. While nearly all states have these selective contracting restrictions, most statutes are extremely limited in scope and impose relatively weak restrictions on physician network formation.[37] Yet states with weaker AWP statutes have higher HMO penetration rates. To avoid private inurement and private benefit provisions, Internal Revenue Service rulings require tax-exempt hospital-physician contracting entities to limit physician representation on governing boards and nonclinical committees to 20 percent, and physician practice assets and services (and hospital services) must be purchased at fair market value. Many states require new hospital-physician joint ventures to seek state insurance licensing, in particular if they accept capitated HMO payments.

Two of the most important concerns in structuring hospital-physician contractual relationships are the antitrust and fraud and abuse laws and regulations. Antitrust challenges can arise when the physicians associated with the venture constitute a large share of physicians in the market and entry by other potential competitors is foreclosed, when physician fees are set collectively for managed care contracts (i.e., price fixing), as well as from exclusive contracting, credentialing, and expulsion from physician panels. Physician compensation arrangements are subject to many regulations, including federal Medicare and Medicaid fraud and abuse statutes and federal Stark amendment provisions

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[37]Jill A. Marsteller, Randall R. Bovbjerg, Len M. Nichols, & Diana K. Verrilli, The Resurgence of Selective Contracting Restrictions, 22 J. Health Politics Policy Law 5 (1997).

prohibiting self-referral. These laws have been interpreted broadly to prohibit or restrict practices that are common in other industries, including payment of bonuses and other incentive payments in return for business referrals.

Aside from regulatory and licensing conditions, entry may be affected by minimum efficient scale and incumbency advantages. The costs to the hospital of planning and coordinating hospital-physician supplier networks are higher when they involve many small, independent physician practices than when the practices are linked together into a larger physician services organization. Hospitals that acquire individual physician practices integrate them into their existing hospital-owned medical group practices, and separate hospital-physician organizations are often used to coordinate physician practice organizations via market contracts. While economies of scale in the practice of medicine occur mainly in the range of approximately six to ten physicians, the minimum efficient scale of an entire physician network for bargaining with health plans is much higher. Market incumbents have advantages (or disadvantages) vis-à-vis new entrants due to prior affiliations with physician practices and reputation in the market.[38]

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[38]Incumbency advantages arise from the bilateral dependency that develops between supplier and buyer during repeated contracting; it can take the form of familiarity that makes communication more effective, specialized learning and knowledge, and both personal and institutional trust. See Oliver E. Williamson, The Economic Institutions of Capitalism (1985).

CHAPTER 3: SUPPLIER NETWORKS AND CHOICE OF HOSPITAL-PHYSICIAN ORGANIZATIONAL FORM

1. INTRODUCTION

Hospitals develop hospital-physician supplier networks for several reasons. Hospitals have high fixed costs and substantial excess capacity,[39] and their main source of revenue over the past few decades – patients covered under fee-for-service insurance contracts – has gradually declined.[40] Managed care contracts provide new opportunities for revenue,[41] but health plans only award these contracts to organized networks of hospitals and physicians, and they require more stringent control of the cost and quality of health care services than do FFS contracts. As a result, hospitals form hospital-physician

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[39]Hospitals' high fixed costs are exacerbated by substantial excess capacity. Post-WWII federal health care programs encouraged hospitals to greatly expand capacity, while demographic trends and changes in the practice of medicine reduced the demand for hospital beds. The hospital industry of the 1990s has had nearly 40 percent excess capacity of hospital beds, well beyond what is needed to handle fluctuations in demand. Because nearly every urban market has substantial excess capacity and there are limited opportunities to use hospital beds and facilities for other purposes, hospital excess capacity generally is not redeployable. Expansion of managed care has further reduced the demand for hospital services. While most hospital care is still paid on a per diem or FFS basis, the average length of stay of patients has declined significantly due to more stringent cost control and utilization management. From 1993 to 1996, average length of stay dropped 13 percent. Figures are from the author's panel data sample of metropolitan short term general acute care hospitals described in Appendix 1.

[40]Results from a survey of 400 randomly selected acute-care hospitals with more than 200 beds nationwide in 1994. Paul J. Kenkel, The Systematic Approach: Physician-Hospital Collaborations Increase, Work to Capture Managed Care Contracts, 24 Mod. Healthcare 14 (1994).

[41]A study of hospitals that developed primary care group practices as part of a national demonstration program conducted over the period 1976 to 1982 found that inpatient days and admissions for the average hospital increased 9.0 percent and 8.2 percent, respectively, over the initial four-year period of group operation, while average market share of inpatient days and admissions rose by 4.9 percent and 3.6 percent, respectively. The establishment of the group practices also helped most hospitals achieve a more favorable outpatient payer mix. See J. R. Wheeler, T. M. Wickizer, & S. M. Shortell, Hospital-Physician Vertical Integration, 31 Hosp. Health Serv. Admin. 2 (1986). Broader physician networks are also associated with higher hospital revenues; see M. Cody, Vertical Integration Strategies: Revenue Effects in Hospital and Medicare Markets, 41 Hosp. Health Serv. Admin. 3 (1996).

supplier networks to better align the incentives of the hospital and physician practice and better coordinate the delivery of hospital and physician services. Hospitals and physicians must invest substantial resources to develop the stringent cost and quality controls that health plans demand for managed care contracts. The level of investment in specialized assets is driven by the demand for cost and quality control. Hospitals protect these investments by choosing organizational forms for their hospital-physician supplier networks that can instill the requisite performance incentives and administrative controls. This chapter compares the organizational alternatives for hospital-physician supplier networks, and evaluates the hospital's choice of organizational form in relation to the market demand for cost and quality control.

2. HOSPITAL-PHYSICIAN SUPPLIER NETWORK TRANSACTION

In the hospital-physician supplier network transaction, a hospital[42] builds a supplier network by evaluating physician practice firms as potential business partners and choosing a hospital-physician organizational form to govern the hospital-physician relationship for managed care contracting.[43] The hospital-physician supplier network can

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[42]The hospital is not the only type of firm used to consolidate managed care contracting activities, although it is the focus of this study. Large physician organizations (e.g., medical group practices), physician practice management companies, and vertically integrated health plans (e.g., Kaiser Permanente) may alternatively serve as the consolidating agent.

[43]Several recent surveys have examined the motivation for the formation of hospital-physician supplier networks. Ernst & Young's 1995 survey found that the hospital's objective in most PHOs is to improve relationships with physicians, share financial risk or raise quality; achieving economies of scale or scope were less important. See Ernst & Young, PHOs: Physician Hospital Organizations -- Profile, 1995. A survey of physicians by Project HOPE for the Prospective Payment Assessment Commission in 1994 found that only half of recent linkages to hospitals (n=141) were undertaken as a means of increasing access to capital or offering their own insurance plan; the overwhelming majority were for negotiating managed care contracts with health plans. See Project HOPE/The Gallup Organization, Results of the Physician Payment Review Commission's 1994 National Survey of Physicians, 1995.

then seek managed care contracts in its local market and deliver services to patients covered under the contracts it obtains. Thus, the hospital-physician network is a supplier of health care services to patients covered by health plans.

Hospitals use hospital-physician networks to attract inpatient admissions and outpatient visits to hospital facilities. Physicians are rarely employees of the hospital, but they have the sole legal authority to admit patients to the hospital. Hospitals depend on their affiliated physicians for a future stream of patient admissions and, given the high fixed costs and low marginal costs of hospital inpatient care, each incremental patient admission is extremely valuable.[44] Physician practice organizations differ in their ability to instill performance incentives and implement administrative controls, and in their methods of selecting physicians to join the physician practice. Hospitals compete with each other on price and nonprice attributes for managed care contracts. A key dimension of nonprice competition is the physician practice organization's reputation for cost and quality control. Thus, hospitals vigorously compete to secure affiliations with physician practices that can best control cost and quality. The next section compares the principal forms of physician practice organization, and explains the hospital's motivation for choosing between these forms to meet specific demands for cost and quality control under managed care contracts.

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[44]James C. Robinson, Physician-Hospital Organization, in The Corporate Practice of Medicine: Competition and Innovation in Health Care (1999).

3. Economic Motivation and Hypotheses

When hospitals contract for physician services, they make two fundamental choices: (1) the form of physician practice organization, and (2) the type of contractual relationship between the hospital and physician practice organization. Physicians are rarely hospital employees. Instead, their employment relationship is a function of the internal organization of the physician practice firm. The physician practice's physical assets are owned either by the firm or individual physicians depending on the corporate structure of the firm. Since the employment relationship of physicians and ownership of their assets are the principal factors driving their economic behavior, the hospital's choice of physician practice organization is the central concern in the formation of hospital-physician supplier networks, the topic of this Chapter.

Hospitals establish a contractual relationship with a physician practice either through a long-term contract or unified ownership, however this choice is independent of the type of physician practice organization. Both the form of physician practice organization and the contractual relationship between the hospital and physician practice influence the financial performance of hospital-physician supplier networks, which is the focus of Chapters 4 and 5.

This chapter uses transaction cost economics theory[45] to compare the alternative forms of physician practice organization and establish a framework for evaluating the hospital's choice of physician practice organization in building hospital-physician supplier networks. Physician practice firms can be organized as contractual networks or

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[45]Williamson, *supra* note 1; Ronald H. Coase, The Nature of the Firm, 4 Economica (1937). This chapter uses a comparative institutional framework to investigate the transaction cost differences that motivate firms to procure services in the market or produce them via internal organization.

integrated firms, each with different financial performance attributes and capacities to adapt to change in market conditions. Hospital-physician networks make investments in specialized assets to achieve the stringent cost and quality control imperative to managed care contracts. Due to limitations in available data, this study cannot test microanalytic hypotheses based on detailed attributes of individual hospital-physician supplier network transactions that is characteristic of empirical research in transaction cost economics. However, this chapter does develop testable research hypotheses that are consistent with transaction cost economics theory and can be tested using more highly aggregated data.

3.1. Internal Organization of the Firm

There are two ways of structuring the employment relationship within a physician practice: (1) as a *network* of independent physicians, or (2) as an *integrated* firm. Integrated firms hire physicians as salaried employees,[46] own the physical assets of the physician practice, and usually consolidate physicians into centralized offices. Network firms allow physicians to remain in their separate offices and link them together via market contracts; physicians are independent contractors rather than employees of the network. Networks have a central administrative office to coordinate managed care contracting with health plans, but the individual physicians own their physical practice assets.

Network and integrated physician practices correspond to two of the discrete structural modes of organizing firms along the vertical integration continuum: spot market, hybrid (network), and hierarchy (integrated). Williamson delineates the

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[46]Integrated firms typically pay physicians a salary plus a performance-based bonus.

comparative costs and competencies of these generic forms of governance structures, their instruments (i.e., incentive mechanisms and administrative controls) and the contract law which supports each structure result in different adaptive performance in response to changes in the market environment.[47] The bureaucratic disabilities of internal organization vary with the structure of the firm.[48] Spot market contracts instill the most high-powered individual performance incentives, but lack administrative control mechanisms.[49] Performance incentive intensity is attenuated in integrated firms, but administrative controls are strengthened.[50] Integrated firms are insulated from exposure to innovations of other firms compared to spot market contracts. Network organizations are intermediate on both incentive intensity and administrative control dimensions. As a result, spot market contracts have superior adaptive performance to disturbances that require individual action (i.e., autonomous adaptation), but inferior performance in coordinated adaptation. Integrated firms have superior performance in coordinated adaptation, but inferior performance in autonomous adaptation. Spot market contracts are the transaction cost economizing organizational choice when firms make few nonredeployable investments in the transaction (i.e., asset specificity is low), whereas integrated firms are the economizing choice for high levels of these specialized

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[47]Williamson, *supra* note 1.

[48]Oliver E. Williamson, Corporate Control and Business Behavior, 1970.

[49]The importance of continuity of services between hospitals and physicians blunts many of the advantages of market contracts, where the ease of switching partners facilitates price and quality improvement; constraints on switching deepen the bilateral dependence of particular physicians and hospitals, increasing internal haggling costs but reducing opportunistic recontracting. See Robinson, *supra* note 92.

[50]Removing transactions from the market reduces individual performance incentives, primarily because internal organization relies more on administrative controls than payment incentives to elicit cooperation and check undesirable behavior. It is rarely possible to replicate the high-powered incentives of market procurement in long-term contracts or within the firm. See Williamson, *supra* note 38, 52.

investments.[51] The effectiveness of governance structures depends upon prevailing market conditions. Disturbances to market structure change the comparative costs and performance of alternative governance mechanisms, thereby favoring some forms of contracting over others.[52] The instruments and adaptive performance of network and integrated firms can be summarized as follows:

Table 3.1: Performance Attributes of Network and Integrated Firms[a,b]

Attribute	Network	Integrated
Instruments		
Incentive intensity	++	+
Administrative controls	++	+++
Performance		
Autonomous adaptation	++	+
Coordinated adaptation	++	+++

[a]Adapted from Williamson, *supra* note 1, Table 4.1.; + = weak, ++ = intermediate, +++ = strong.

[b]These structures are supported by different forms of contract law, which are not shown here.

Vertically integrated firms are slower to adapt to rapidly changing market conditions than those organized through market procurement, although they are better able to implement coordinated adaptation throughout the enterprise.[53] Vertically-integrated health care delivery systems have performed relatively poorly in recent years due to slower adaptation of payment mechanisms and utilization management and adjustment of

[51]The hospital's transaction-specific investments in physician practices are discussed in the next section.

[52]Oliver E. Williamson, Strategizing, Economizing, and Economic Organization, 12 Strat. Mgmt. J. (1991).

[53]Williamson, *supra* note 52.

capacity.[54] This slower adaptation can be traced to reduced performance incentives and heightened influence costs of internal politicking,[55] which result in increased bureaucratic costs.[56]

The next section describes these generic governance structures (i.e., network and integrated firms) and attributes in terms of the physician practice organizations that are the focus of this study.

3.2. Distinguishing Features of Physician Practice Firms

Medical group practices are *integrated* physician practice firms. There are three principal *network* forms of physician practice: the independent practice association (IPA), closed-panel physician-hospital organization (closed PHO), and open-panel physician-hospital organization (open PHO). This study focuses on these four principal types of physician practice firms. Hospitals either have direct contractual relationships with physician practices or they contract with physician practices through a corporate subsidiary.[57] In either case, the primary determinant of performance is the internal organization of the physician practice since it alone determines the physician's employment relationship and the ownership of physician practice assets. Hospitals have

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[54]Snail & Robinson, *supra* note 18.

[55]Robinson, *supra* note 92.

[56]Williamson, *supra* note 1.

[57]These corporate subsidiaries include medical foundations and management services organizations (MSOs). This study finds that these corporate subsidiaries virtually always accompany one of the four principal forms of physician practice organization. See Snail & Robinson, *supra* note 18; Lawton R. Burns & Darrell P. Thorpe, Trends and Models in Physician-Hospital Organization, 18 Health Care Mgmt. Rev. 4 (1993); and Michael A. Morrisey, Jeffrey Alexander, Lawton R. Burns, & Victoria Johnson, Managed Care and Physician/Hospital Integration, 15 Health Aff. 4 (1996).

developed supplier networks with physician group practices and IPAs since the advent of managed care, and began to make widespread use of PHOs in the 1990s.[58]

Group practices (i.e., integrated firms) differ from network forms of physician practice in ways suggested by Table 3.1. Group practices generally achieve better cost and quality control than network firms due to strong group norms and peer review[59] and the single bottom line of the vertically integrated firm; this comes at the cost of lower productivity and higher bureaucratic costs of internal organization. Network forms (e.g., IPAs) are less expensive to capitalize and expand and they give physicians greater exposure to each others practice innovations, but they suffer from diffuse structure and governance.[60] Once the fixed costs of establishing a network physician practice firm have been incurred (i.e., a central administrative office), the marginal cost of adding additional physicians to the network is very small since it does not involve the purchase of the physician practice assets.[61] However, it is more difficult to impose stringent administrative controls in network forms of physician practice than integrated firms.

The differences amongst network forms of physician practice are smaller than the differences between network and integrated firms. An IPA is formed and governed by physicians, while a hospital forms a PHO and shares governance with physicians.

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[58]The American Medical Association estimated that approximately 3,000 IPAs and 3,000 PHOs had formed by the end of 1996, each typically representing hundreds of physicians. Mary Chris Jaklevic, As More and More Doctors Join Physician Groups, Antitrust Experts Wonder Whether Hospitals and Health Plans Will be...Outgunned, 27 Mod. Healthcare 46 (1997).

[59]John M. Eisenberg, Doctors' Decisions and the Cost of Medical Care: The Reasons for Doctors' Practice Patterns and Ways to Change Them, 1986.

[60]James C. Robinson & Lawrence P. Casalino, Vertical Integration and Organizational Networks in Health Care, 15 Health Aff. 1 (1996).

[61]Peter R. Kongstvedt & David W. Plocher, Integrated Health Care Delivery Systems, in The Managed Health Care Handbook, 1996.

Physicians have less opportunity to participate in governance of PHOs than IPAs, thus PHOs cannot implement as strong administrative controls on physicians. There are two types of PHOs: *open-panel* and *closed-panel*. Open panels allow any physician who has basic medical credentials to join the practice.[62] Closed panels of physicians are chosen through selective contracting[63] on the basis of their prior performance and reputation for high quality and cost effectiveness.[64] Thus, closed-panel PHOs have stronger administrative controls than open-panel PHOs. Closed panel organizations are more likely to achieve the incentive alignment for stringent cost and quality control than are unselective open panels, which tend to be larger.[65] The three network forms of physician practice organization have similar capabilities to respond to autonomous adaptations, but open-panel PHOs have weaker coordinated adaptation capabilities than closed-panel PHOs or IPAs. While closed-panel PHOs and IPAs have similar or stronger instruments and performance than open-panel PHOs on most dimensions, open-panel PHOs require less financial and human capital[66] to establish and expand than the organizational

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[62]Membership in the hospital's medical staff is usually required.

[63]Selective contracting is described in detail in Appendix 2, Physician Practice Governance Mechanisms.

[64]In 1994, nearly half of all closed-panel PHOs evaluated the physician's contribution to financial performance (i.e., economic credentialing) in selecting potential physician panel members. See Abbey & Treash, *supra* note 36.

[65]James C. Robinson, Payment Mechanisms, Nonprice Incentives, and Organizational Innovation in Health Care, 30 Inquiry 3 (1993);

[66]The specialized financial and human capital assets of physician practice are discussed in the next two sections.

alternatives.[67] The performance attributes of the four principal forms of physician practice organization are shown in Table 3.2:[68]

Table 3.2: Performance Attributes of Physician Practice Firms[a]

	Network			*Integrated*
Attribute	Open-panel PHO	Closed-panel PHO	IPA	Group Practice
Instruments				
Incentive intensity	++	++	++	+
Administrative controls	+	++	++	+++
Performance				
Autonomous adaptation	+++	++	++	+
Coordinated adaptation	+	++	++	+++

[a]+ = weak, ++ = intermediate, +++ = strong.

The two types of physician practice adaptation (i.e., autonomous and coordinated) correspond to the ability to share financial risk between the health plan and physician practice in distinct types of managed care contracts. Risk-sharing capabilities stem from the physician practice's ability to instill performance incentives and implement administrative controls (e.g., monitoring of physician effort).[69] PPO contracts involve virtually no risk-sharing, while HMO contracts involve moderate (non-capitated contracts) to high levels of risk-sharing (capitated contracts). Thus, PPO contracting

[67]Physician organizations also differ on other dimensions such as scale. A nationwide survey of 105 hospital and system CEOs (80 percent response rate) found the average number of physicians in physician practice organizations that were part of hospital-physician networks to be as follows: PHO (571), IPA (215), primary care group practice (15), specialty care group practice (8). See Howard S. Zuckerman et al, Physicians and Organizations: Strange Bedfellows or a Marriage Made in Heaven?, 14 Frontiers of Health Services Research 3 (1998).

[68]Table 3.2 omits a column for spot market contracting, which corresponds to solo and independent small group practices, to keep this section focused on the aspects of the theory that are tested in this study.

[69]Risk sharing and the pursuit of managed care contracts is the subject of Chapter 4.

corresponds to autonomous adaptation, and HMO contracting to coordinated adaptation. Risk sharing and the pursuit of managed care contracts is the focus of Chapter 4. Autonomous and coordinated adaptation also correspond to individual and joint efforts of the hospital and physician practice to control hospital cost and quality, the focus of Chapter 5.

The attributes in Table 3.2 are the principal dimensions along which physician practice organizations differ, but not the only dimensions;[70] Appendix 2 (Physician Practice Governance Mechanisms), describes specific methods of instilling performance incentives and implementing administrative controls in physician practice organizations (e.g., selective contracting, utilization management, and payment mechanisms). A direct study of these fundamental mechanisms in hospital-physician supplier networks would be informative, but the data to conduct such an analysis are not tabulated in any centralized repository and are not yet publicly available. While there are multiple ways to combine incentive and control mechanisms that affect physician behavior, they are usually found in particular combinations.[71] Of these mechanisms, only selective contracting can be examined directly with available data since it is the primary feature of closed-panel PHOs that open-panel PHOs lack. Instead of examining variations in each of these individual mechanisms, this study focuses on regularities arising from the discrete structural combinations of these mechanisms embodied by the four principal forms of physician

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[70]Abbey & Treash, *supra* note 36; Gloria J. Bazzoli, Linda Dynan, & Lawton R. Burns, Capitated Contracting of Health Provider Organizations, unpublished manuscript (1997); Lawton R. Burns & Darrell P. Thorpe, Managed Care and Integrated Healthcare, in Health Care Management: Managed Care (1995); Burns & Thorpe, *supra* note 57; Dynan et al, *supra* note 60; Thomas M. Gorey, Management Services Organizations, 1997; Morrisey *et al*, *supra* note 57; Robinson & Casalino, *supra* note 60; Snail & Robinson, *supra* note 18.

[71]Robinson, *supra* note 65.

practice organization. While we do observe the choice of physician practice organizations through regular surveys of hospitals, empirical research on the subject is extremely limited.[72]

Specialized Assets

The performance implications of Tables 3.1 and 3.2 are predicated on the following premise: the transaction cost economizing choice shifts from networks to the integrated firm as assets become more highly specialized to the transaction, not redeployable to other purposes without substantial loss in value,[73] and subject to "hold-up" and other forms of opportunism.[74] The conventional wisdom is that most physician practice assets are not specialized to hospital-physician supplier networks; a physician's basic training is relatively generic and transferrable between most hospital settings. However, cost-effective practice patterns are difficult to develop and depend on team and organizational factors that are not easily transferrable. Substantial capital costs are required to set up hospital-physician supplier networks, and the investments are not recoverable upon dissolution of the network without great loss in value. Thus, two types of specialized assets influence the hospital's choice of physician practice organization: (1) *financial capital* investments in hospital-physician network start up costs, purchase of physician practices, and idiosyncratic information systems; and (2) *intellectual capital* investments

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[72]Recent empirical literature on hospital organization is reviewed in Snail & Robinson, *supra* note 18. The few empirical studies to analyze specific forms of physician-hospital organization using regression models include Bazzoli, Dynan, & Burns, *supra* note 70; Dynan et al, *supra* note 60; Burns & Thorpe, *supra* note 57; and Morrisey *et al*, *supra* note 57.

[73]Benjamin Klein & K. B. Leffler, The Role of Market Forces in Assuring Contractual Performance, 89 J. Pol. Econ. 4 (1981).

[74]Williamson, *supra* note 38.

to develop cost-conscious physician practice patterns encoded in productive teams. The next two sections describe these forms of specialized assets.

This chapter can only indirectly test research hypotheses related to specialized assets due to limitations in available data. A direct test of the influence of specialized assets on choice of organizational form requires specialized assets to be measured for each transaction (i.e., a particular hospital-physician supplier network). However, available data reflect *market-level* specialized assets (i.e., aggregated across similar transactions) instead of assets of an *individual transaction.* In effect, the research hypotheses developed in this chapter ask whether hospital-physician supplier networks will make additional specialized investments and adopt protective governance structures – PHOs, IPAs, or group practices – as aggregate *market-level* investments in specialized assets rise.

3.3. Financial Capital

The capital required to establish a hospital-physician supplier network depends upon several factors, including startup costs for the organization, the cost of information systems, and the cost of physician practices; the magnitude of these costs varies with the type of physician practice organization (i.e., network or integrated firm). A hospital-physician network initially incurs substantial legal and management staff costs (or consulting fees) to structure a business entity that meets prevailing legal and regulatory requirements (e.g., antitrust, corporate practice of medicine), and to obtain any requisite health care licensing.[75] The network must also negotiate an agreement that meets the

[75]Tax-exempt (i.e., non-profit) and for-profit hospitals have different legal considerations in structuring a hospital-physician network, and a variety of antitrust concerns may arise in any hospital-physician network. Hospital-physician networks that plan to seek capitated HMO contracts may require a

needs of the particular hospital and physician practice. The legal and management costs are only partly recoverable if there is a change in either the physician practice or hospital partner organization; the costs of negotiating the hospital-physician agreement are not recoverable. These startup costs typically range from hundreds of thousands to millions of dollars, depending on the type and scale of the hospital-physician network.[76, 77]

Managed care has greatly increased the need for monitoring of physician practice patterns, the use of health care services by patients, and the cost, quality, and outcomes of specific episodes of care compared to FFS contracts. Hospital-physician networks must make substantial investments in complex clinical and management information systems to achieve the high degree of coordination needed to control cost and quality of care under managed care contracts.[78] Hospitals typically have idiosyncratic information systems that reflect their unique institutional history and business requirements, and commercial software vendors make significant customized modifications to their

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state health insurance license. See Chapter 2, Section 3.3. Entry Conditions and Regulation.

[76]Milliman & Robertson recently compared the costs of hospital contracting for physician services for a medium-sized hospital organization located in a small Midwestern U.S. city. Two of the alternatives included spot market procurement and establishment of a PHO (with no purchase of physician practices). The costs of spot market procurement include actuarial evaluation and legal review of proposed contracts, typically $25,000 per contract. Additional costs related to information systems modifications to administer the contracts vary depending on the capabilities of current systems. A recent national survey found that start-up capital costs for PHOs typically range from $40,000 to $250,000 with an average of $100,000. These costs include legal, consulting, and miscellaneous pre-opening expenses. Ongoing capital needs are typically $500,000 per year, but they vary significantly with the extent of infrastructure development required (e.g., information systems). See Oscar M. Lucas, Research Report: Managed Healthcare Business Models for Hospital Organizations, Milliman & Robertson, Inc., 1997.

[77]Three hospitals in Mississippi jointly formed a PHO representing 350 affiliated physicians in a market with relatively low managed care penetration. Physicians provided half of the roughly $1 million in capital needed to establish the PHO. Approximately 100 primary care physician members each contributed $1,100, while 250 specialists each provided $1,500. The organization is controlled by two classes of voting stock; hospitals control six votes, while physicians control ten votes. Most decisions require a simple majority of each voting class. See Kenkel, *supra* note 40.

[78]Lucas, *supra* note 76.

products to accommodate the needs of individual hospitals.[79] Physician practice organizations have idiosyncratic information systems for the same reasons, although they usually invest far less in information systems than hospitals.[80] Hospital-physician networks must exchange information between the idiosyncratic systems of the hospital and physician practice. The costs of linking the information systems is not recoverable if either the hospital or physician partner changes. Furthermore, hospitals rarely own the physical assets of physician practice organizations, so investments in physician practice information systems are generally not recoverable by the hospital.

The capital costs for physician practices vary depending upon the type of physician practice organization. Integrated physician practice firms purchase the entire physician practice or its physical assets, while network firms establish market contracts with physicians but do not purchase their assets. Hospitals that form hospital-physician networks by acquiring physician practices (i.e., unified ownership) require more startup capital than networks formed through long-term contracts between the hospital and physician practice organization.[81, 82] Even when hospitals do not purchase physician

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[79]Timothy S. Snail *et al*, Overcoming Barriers to Implementation and Integration of Clinical Information Systems, Abt Associates, November 1993.

[80]Most physicians practice in small firms – the average size of physician practices in the U.S. is 10.5 physicians (see American Medical Association, Medical Groups in the U.S., 1995) – generally partnerships or professional corporations. Less than 5 percent of physician practices retain any earnings (see Clarke, Coddington, & Moore, *supra* note 82), leaving few capital resources to implement sophisticated clinical information systems. Physician practices look to larger business partners (e.g., hospitals) for an infusion of capital, upgrades to information and communication systems, better wage and benefit packages for support staff, and more depth of experience in management and contracting (see Zismer & Lund, *supra* note 81). Hospitals have had solid profit margins from their private insurance and Medicare businesses at least through the mid-1990s (see Robinson, *supra* note 44), and they typically retain a much higher share of their earnings than do physician practices. Hospitals (and hospital systems) have the scale and reliable revenue streams to make substantial capital investments in information systems and infrastructure.

[81]A recent study developed a financial model of the net cost to a hospital of acquiring and operating a 50-physician primary care practice network. The cost of acquiring physician practice assets was assumed to be $150,000 per physician, with intangible assets amortized over 15 years. Under best practice

practices, the cost of market contracts with physician practices reflects the cost of forming and operating the physician practice organization.[83] Under managed care, hospitals engage in intense competition to tie physicians to their own delivery system instead of a competitor's[84] and to select physicians who have cost-effective medical practice patterns.[85] Hospitals attempt to tie physicians to their own delivery system by making specialized capital investments in the physician practice, often in the form of information systems and income guarantees for physicians. This intense competition for physicians has substantially raised the market valuation of physician practices.

The hospital's investments into financial capital assets that are specialized to the hospital-physician network creates a moral hazard, which rises in magnitude with the capital investment. Once it makes these specialized capital investments, the hospital has an interest in the financial performance of the physician practice. Since physicians

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operating performance levels that are above average but considered attainable, the physician network cost $2.2 million per year to operate, or the equivalent of a $43,432 per-physician annual operating deficit. This model includes only the direct costs of the primary care practice, not indirect effects on hospitalization. It also assumes that primary care physician incomes will increase when they move from private practice to become part of a hospital-sponsored network. See Daniel K. Zismer & Douglas E. Lund, Health System-Sponsored Primary Care Networks: Achieving Best Practice Financial Performance, Towers Perrin Health Indus. Res. Rep. 1 (1998).

[82]Hospital annual subsidies to primary care physicians often exceed $50,000 per physician partly due to income guarantees for acquired practices. See Richard L. Clarke, Dean C. Coddington, & Keith D. Moore, Capital and Medical Groups, 46 Med. Group Mgmt. J. 1 (1999).

[83]Physicians have historically been independent contractors who practice in small, entrepreneurial firms and place a high value on autonomy. Hospitals, health plans, and physician practice management companies have found it difficult and costly to develop long-term relationships with physician practices, to instill effective performance incentives, and to prevent physicians from reneging on contracts. See John D. Cochrane, Rise and Fall of MedPartners, Integrated Healthcare Report, March (1999).

[84]Tami L. Mark, William N. Evans, & Claudia L. Schur, Hospital-Physician Relations: A Multivariate Analysis of Hospital Financial Performance, Prospective Payment Assessment Commission, 1996.

[85]Hospitals purchased over 5,000 physician practices per year in the mid-1990s, and much of this was attributed to the desire to secure the exclusive affiliation of primary care physicians. Results of a survey of 17 hospitals by Coopers & Lybrand in George Anders, Hospitals that Gobbled up Physician Practices Feel Ill; High Costs and a Decline in Productivity Among Doctors Brings Losses, Wall Street Journal, 17 June (1997); Snail & Robinson, *supra* note 18.

control the majority of resource utilization decisions in the hospital, they act as agents of the hospital (the principal) to make cost-effective use of these assets. However, physician work effort is difficult (and costly) to observe and monitor;[86] nonphysicians cannot easily determine which tests and procedures are appropriate or do so in a timely manner that does not interfere with the process of patient care. Much of the monitoring of individual physicians is done by their peers in the physician practice.[87] Once hospitals make specialized capital investments in the hospital-physician network, physicians are less likely to as vigilant in monitoring their own effort than when they incur the full cost and responsibility of monitoring their own effort. Physicians who are members of integrated firms (i.e., group practices) work in closer proximity to their peers and develop stronger group norms than their counterparts in network firms (i.e., PHOs and IPAs), thus they are more likely to be subject to peer review.[88] The divergence in incentives between individual physicians and the physician practice organization makes the integrated firm (i.e., group practice) the economizing choice as moral hazard rises.

This section has identified two motivations for hospitals to make specialized financial capital investments in physician practices: to secure the affiliation of cost-effective physicians to the hospital-physician network, and to improve financial performance of the physician practice. These specialized investments are more easily protected in an integrated physician practice firm, but integrated firms require substantially more capital

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[86]Manuel C. Pontes, Agency Theory: A Framework for Analyzing Physician Services, 20 Health Care Mgmt. Rev. 4 (1995).

[87]The structure and governance of physician practices is discussed in Appendix 2, Physician Practice Governance Mechanisms.

[88]Eisenberg, *supra* note 59.

for the hospital to establish and operate than network firms (irrespective of the specialized capital investments discussed above). If a hospital market becomes less competitive over time (e.g., as a result of mergers and closures), hospitals in the market need not resort to costly integrated physician practice firms to meet these two objectives; they can protect their specialized investments through network firms that require substantially lower capital investments. By contracting with network firms instead of integrated firms, hospitals make fewer specialized financial capital investments that are at risk of moral hazard.

Hypothesis 3.1: Hospitals will choose less capital-intensive forms of physician practice organizations to form hospital-physician supplier networks as hospital competition abates ceteris paribus.

3.4. Intellectual Capital

Hospitals compete with each other on price and nonprice attributes for managed care contracts, and seek to strengthen their bargaining positions with health plans that selectively contract with providers based on their reputation for cost containment and quality control.[89] A key element of nonprice competition is the reputation of hospital-affiliated physician practices for quality and cost control. Goodwill assets between the hospital and physicians and brand name reputation of the hospital-physician supplier network are difficult to develop.[90] Cost-effective physician practice patterns are not only difficult to develop, but they depend on team and organizational factors that are not easily

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[89]J. Zwanziger, G. A. Melnick, J. Mann, & L. Simonson, How Hospitals Practice Cost Containment with Selective Contracting and the Medicare Prospective Payment System, 32 Med. Care 11 (1994).

[90]The development of medical group practice brand name assets is described in Thomas E. Getzen, A Brand Name Firm Theory of Medical Group Practice, 33 J. Indus. Econ. 2 (1984)

transferrable between firms. Cost-effective physician practice patterns, reputation[91] for high quality, and other intellectual capital assets become more specialized as physician practices gain experience in managed care contracting. The greatest gains in managing health care services are likely to come from process innovations in which knowledge is tacit and encoded in team behavior, making them difficult to transmit by contract.[92]

The intellectual capital assets associated with managed care contracting are difficult to develop and confer substantial competitive advantages on delivery systems that successfully develop them.[93] Capitation rates and the physician compensation formulas that instill performance incentives are the most closely guarded information by physician practices.[94] These assets have weak intellectual property protection: practice patterns are not patentable, team skills depart with peer groups of physicians, and financial reward formulas can be imitated once revealed. The imperative for hospitals to secure physician affiliations for managed care contracts, and the difficulty in protecting investments in these intellectual capital assets, creates the potential for severe hold-up by physicians.

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[91]Reputational assets explain much of hospital diversification into home health care and ambulatory care services; see James C. Robinson, The Changing Boundaries of the American Hospital, 72 Milbank Q. 2 (1994).

[92]James C. Robinson, Physician-Hospital Integration and the Economic Theory of the Firm, 54 Med. Care Res. Rev. 1 (1997).

[93]James C. Robinson, Financial Capital and Intellectual Capital in Physician Practice Management, 17 Health Aff. 4 (1998).

[94]Maurice Penner, How HMOs Assess Medical Groups and IPAs, 5 Managed Care Q. 2 (1997); Barbara E. Rodin, PPO and HMO Performance Factors: Insurance Company Evaluation Criteria, 1 Managed Care Q. 1 (1993)

Vertical integration may reduce hold-up potential for investments in readily appropriable but difficult-to-acquire intellectual capital[95] and for assets of a productive team.[96]

The data are not available to measure the level of investment in intellectual capital assets by specific hospital-physician supplier networks. However, it is possible to assess the *market-level* indicators of investment in the development of cost and quality controls. Investments in specialized intellectual capital assets allow hospitals and physician practices to develop more stringent cost and quality control methods. These hospitals and physician practices are better able to accept managed care contracts and managed care contracts with greater financial risk than those that make lower investments in cost and quality control. Thus, in markets with substantial investments in intellectual capital for cost and quality control we expect higher levels of managed care contracting (i.e., a greater share of the population covered by HMO insurance plans) and more stringent levels of cost and quality controls (e.g., a greater share of physician payments made on a capitated basis). Markets that have higher levels of managed care contracting have generally seen more experimentation with cost and quality control measures and have developed more stringent controls.[97] As the *market-level* investment in cost and quality control rises, the potential for hold-up of individual hospital-physician network intellectual capital investments falls since these assets become less specialized to the

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[95]Kirk Monteverde & David J. Teece, Supplier Switching Costs and Vertical Integration in the Automobile Industry, 13 Bell J. Econ. 1 (1982); David J. Teece, Capturing Value from Technological Innovation: Integration, Strategic Partnering, and Licensing Decisions, 18 Interfaces 3 (1988).

[96]Benjamin Klein, Vertical Integration as Organizational Ownership: The Fisher Body-General Motors Relationship Revisited, 4 J. Law Econ. 1 (1988).

[97]Miller, *supra* note 29; see Chapter 2, Section 3.1. Characteristics of Buyers, Sellers and Demand.

individual network. As assets become less specialized, vertical integration is no longer necessary to protect these investments.

Hypothesis 3.2: As market-level investment in cost and quality control rises, hospitals will choose physician practice organizations that are network firms instead of integrated firms in building hospital-physician supplier networks.

4. Data and Predicted Coefficients

Each year the American Hospital Association (AHA) conducts a detailed survey of its member hospitals, which include virtually 100 percent of general and specialty hospitals. The Annual Survey of Hospitals provides detailed data on the capacity, staffing, operation, finances, and many other characteristics of each hospital. It also provides limited data on the hospital's hospital-physician supplier networks: the types of affiliated physician practice organizations (e.g., open-panel PHO, IPA), and their relationship to the hospital (i.e., long-term contract or unified ownership). Additional data on hospitals (e.g., patient severity of illness) were obtained from the Health Care Financing Administration (HCFA), and market-level data on HMOs and physician payment were provided by InterStudy.[98] These data are widely used in studies of the economic behavior of hospitals.

The AHA survey does not provide detailed data on the employment relationship within the physician practice organization (e.g., number of physicians, payment mechanisms), intellectual capital investments in cost and quality control, or financial

[98]The data used in this study are described in detail in Appendix 1, Data Sources.

capital investments in specific assets of interest to this study (e.g., physician practices, information systems). Thus, this study cannot conduct the type of transaction-specific microanalytic hypothesis testing that is characteristic of empirical research in transaction cost economics. However, data are available to test hypotheses based on hospital-level composite measures of the physician practice employment relationship (i.e., network versus integrated firm), market-level financial capital investments, and market-level intellectual capital investments in cost and quality controls. Hospital-physician supplier networks most certainly vary on dimensions that are not captured by these data. Provided that these unobserved dimensions of hospital-physician supplier networks do not systematically bias our results, we can evaluate the consistency of hospital choice of physician practice organizations to economic theory based on composite hospital-physician supplier network activity and market-level characteristics. Every multivariate regression analysis in this study uses fixed effects panel data estimation techniques to control for unobserved heterogeneity at the level of the firm. Because fixed effects panel data techniques are used, every model investigates how the *change* in the independent variables affects *change* in the dependent variable.

In the models of hospital choice of physician practice organization presented in this chapter, four different dependent variables are investigated. Each dependent variable indicates the hospital's binary decision to use (or not use) one of the four principal forms of physician practice organization (i.e., open-panel PHO, closed-panel PHO, IPA, group practice) in building its hospital-physician supplier networks.

Predictions

Hypothesis 3.1 predicts that hospitals will choose less capital-intensive forms of physician practice organizations to form hospital-physician supplier networks as hospital competition abates. Network physician practice firms are less-capital intensive forms than integrated firms. Hospital competition is inversely related to hospital concentration, where hospital concentration is measured by the Herfindahl-Hirschman Index (HHI) of hospital admissions. Thus, hospital competition abates as hospital concentration rises.

Hypothesis 3.2 predicts that as market-level investment in cost and quality control rises, hospitals will choose physician practice organizations that are network firms instead of integrated firms in building hospital-physician supplier networks. As hospitals find their competitors developing more stringent cost and quality control methods (as measured by market-level investments in cost and quality control), they must also make greater investments in cost and quality control to successfully compete for managed care contracts. Market-level investment in cost and quality control is measured by four variables: (1) the percentage of health plan reimbursements to physician practices for primary care services that are capitated in the market, (2) the percentage of health plan reimbursements to physician practices for specialty care services that are capitated in the market, (3) the percentage of the population in the market that are covered by HMO insurance (i.e., HMO penetration), and (4) the number of HMOs in the market. The level of capitated physician reimbursement measures the degree to which physician practices in a market can sustain the most stringent payment regime for their services.[99] HMO

[99]Hospitals are striving to change the composition of their physician networks. Primary care physicians are highly valued as "gatekeepers" who control referrals to expensive specialty physician care,

penetration and the number of HMOs are generally higher in more mature markets that have had greater experience with managed care contracting, and thus greater market-level investment in cost and quality control.

Table 3.3 summarizes the hypothesized signs of coefficients of key variables in models of the hospital's choice of physician practice organization in forming hospital-physician supplier networks.

Table 3.3: Predicted Coefficients for Hospital Choice of Physician Practice Organization

Dependent Variable[a]	Independent Variable	Predicted Sign	Hypothesis
Network			
	Hospital market concentration (HHI admissions)	+	3.1
	Primary care phys. market reimb. capitated (%)	+	3.2
	Specialty care phys. market reimb. capitated (%)	+	3.2
	HMO market penetration (%)	+	3.2
	Number of HMOs in market	+	3.2
Integrated			
	Hospital market concentration (HHI admissions)	-	3.1
	Primary care phys. market reimb. capitated (%)	-	3.2
	Specialty care phys. market reimb. capitated (%)	-	3.2
	HMO market penetration (%)	-	3.2
	Number of HMOs in market	-	3.2

[a] *Network* physician practice organization models have dependent variables Open-panel PHO, Closed-panel PHO, and IPA; *Integrated* models have the dependent variable Group practice.

The models include independent variables to control for other important firm-level and market characteristics, although no hypotheses are offered for these control variables in an effort to keep the analysis focused on the principal economic phenomena of interest. These control variables include a binary indicator of the presence of state-level any

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and having plausible mechanisms in place to control these high-cost resources is a precondition to managed care contracting. Furthermore, managed care's emphasis on primary care over specialty care has exacerbated the relative oversupply of specialists and undersupply of primary care physicians in relation to demand; see R. M. Politzer *et al*, Matching Physician Supply and Requirements: Testing Policy Recommendations, 33 Inquiry 2 (1996). As a result, hospitals engage in intense competition to tie primary care physicians to their own delivery system instead of a competitor's and to select both primary care and specialist physicians who have cost-effective medical practice patterns; see Mark et al, *supra* note 84.

willing provider (AWP) regulation and a variety of hospital attributes: the number of fully staffed general acute care beds, a binary indicator of hospital membership in a multihospital system, the number of hospital beds (i.e., scale) in the system, the case mix index of average patient severity of illness, and binary indicators of whether the hospital is a for-profit corporation or government entity (omitted category: non-profit corporation).[100]

Descriptive Statistics

Table 3.4 reports means for dependent variables in the models based on the panel of 1,904 hospitals operating in 1993 and 1996 that met the study criteria;[101] a full set of descriptive statistics for market-level variables are provided in Table 2.2, and for the remaining variables in Tables 3.5a and 3.5b. All figures represent the percentage of hospitals that use a particular type of physician practice organization in their hospital-physician supplier networks. The first column identifies the type of physician practice organization. The remaining columns identify the relationship between the hospital and the physician practice organization. The hospital-physician practice relationship falls into one of two broad categories: spot market[102] or any formal contract. Formal contracts can be subdivided into long-term contracts or unified ownership arrangements.

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[100]The variables and data sources are described in detail in Appendix 1, Data Sources.

[101]Sample selection criteria are described in detail in Appendix 1.

[102]"Spot market" includes informal contracts.

Table 3.4: Trends in Hospital Contracting for Physician Services, 1993-96[a]

Form of Physician Practice	Hospital-Physician Practice Relationship			
	Spot Market Contract	Any Formal Contract	Type of Formal Contract: Long-term Contract	Type of Formal Contract: Unified Ownership
1993				
% with Open-panel PHO		.066	.006	.060
% with Closed-panel PHO		.191	.041	.157
% with IPA		.280	.172	.116
% with a network form		*.425*	*.188*	*.281*
% with Group practice		.272	.120	.161
% with other forms[b]		.206	.047	.165
% with any form	*.327*	*.673*	*.280*	*.454*
1996				
% with Open-panel PHO		.334	.055	.309
% with Closed-panel PHO		.190	.034	.176
% with IPA		.391	.066	.355
% with a network form		*.675*	*.118*	*.634*
% with Group practice		.126	.019	.116
% with other forms[b]		.492	.061	.468
% with any form	*.153*	*.847*	*.150*	*.662*
N = 1904				

[a] Hospitals may have more than one form of contracting arrangement, but the majority of changes between 1993-96 involved only one form (or a switch to a single other form) per hospital.

[b] Other forms include medical services organizations and medical foundations, which accompany one of the four principal forms of physician practice organizations.

Overall there was a strong shift from spot market procurement toward formal contracting between hospitals and physician services organizations over the period (67.3 to 84.7 percent), and from organizing the hospital-physician relationship under long-term contracts to unified ownership. Hospital contracting with open-panel PHOs increased most over the period. Contracting with closed-panel PHOs were nearly unchanged, while there was a substantial decline in contracting with group practices.

These statistics reflect aggregate trends in hospital contracting for physician services without controlling for changes in market conditions. However, if the research

hypotheses are supported, we expect to find that the substantial shift from group practices to network firms reflects the choice of less capital-intensive forms of physician practice organizations as hospital competition abates. Furthermore, the shift from integrated to network physician practice organizations is expected to reflect rising market-level investment in cost and quality control.

While general strategies for integrating physicians into hospital governance have been studied,[103] few empirical studies have examined the determinants of hospital contracting with specific forms of physician practice organizations (e.g., PHO, IPA).[104] No study has yet investigated the determinants of specific forms of hospital contracting for physician services using a multivariate regression model, nor with a panel data model.

Tables 3.5a and 3.5b report means and standard deviations for the variables in the four models of hospital choice of physician practice organization. Most of the variables are dichotomous so the means represent the percentage of hospitals with the indicated characteristic (e.g., 13.3 percent of hospitals contracted with physicians via an open-panel PHO in 1993). The means for the independent variables are similar across models, but not identical. As explained in the next section, these models are estimated using conditional logit techniques. The only observations that contribute to the estimation results are those with values for all variables and those whose dependent variable changes over time. The estimation samples shown in Tables 3.5a and 3.5b are smaller than the full sample of 952 hospitals per year for two reasons: not all hospitals answered each

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[103]Tami L. Mark, William N. Evans, Claudia L. Schur, & Stuart Guterman, Hospital-physician Arrangements and Hospital Financial Performance, 36 Med. Care 1 (1998).

[104]Morrisey, *supra* note 57; Snail & Robinson, *supra* note 18.

question in the survey upon which the data are based, and not all had change in the dependent variable over time.

Table 3.5a: Descriptive Statistics, 1993[a]

Variable	Physician Practice Organization: *Network* — Open PHO	*Network* — Closed PHO	*Network* — IPA	*Integrated* — Group Practice
Dependent variable	.133	.503	.316	.749
	(.340)	(.500)	(.465)	(.434)
Market Structure				
HHI hospital admissions	3,353	3,118	3,071	2,927
	(2,815)	(2,819)	(2,707)	(2,765)
Prim. care phys. capitated (%)	.443	.450	.434	.453
	(.239)	(.245)	(.245)	(.249)
Spec. care phys. capitated (%)	.160	.178	.186	.183
	(.187)	(.202)	(.203)	(.209)
HMO penetration (%)	.169	.185	.189	.197
	(.115)	(.118)	(.122)	(.121)
# of HMOs	7.540	7.189	8.371	8.455
	(6.732)	(6.256)	(7.202)	(7.110)
Case mix index	1.424	1.441	1.420	1.448
	(.219)	(.221)	(.219)	(.232)
AWP regulation (%)	.156	.160	.154	.195
	(.362)	(.367)	(.361)	(.400)
Hospital Characteristics				
Beds	288	301	276	308
	(212)	(210)	(204)	(226)
System member (%)	.448	.482	.468	.475
	(.498)	(.500)	(.499)	(.500)
System scale (staffed beds)	2,674	2,766	2,629	2,072
	(5,663)	(5,794)	(5,856)	(4,878)
For-profit (%)	.136	.147	.150	.104
	(.343)	(.354)	(.356)	(.305)
Government (%)	.103	.112	.100	.120
	(.305)	(.317)	(.300)	(.325)
N	*697*	*593*	*572*	*558*

[a] Standard error in parentheses.

Table 3.5a: Descriptive Statistics, 1996[a]

Variable	Physician Practice Organization: *Network* — Open PHO	*Network* — Closed PHO	*Network* — IPA	*Integrated* — Group Practice
Dependent variable	.867	.497	.684	.251
	(.340)	(.500)	(.465)	(.434)
Market Structure				
HHI hospital admissions	3,354	3,232	3,173	3,033
	(2,823)	(2,840)	(2,715)	(2,739)
Prim. care phys. capitated (%)	.480	.476	.487	.489
	(.238)	(.238)	(.235)	(.232)
Spec. care phys. capitated (%)	.205	.220	.222	.209
	(.184)	(.201)	(.206)	(.191)
HMO penetration (%)	.222	.237	.245	.252
	(.128)	(.128)	(.134)	(.136)
# of HMOs	9.654	10.196	10.247	10.487
	(5.917)	(5.695)	(5.957)	(5.976)
Case mix index	1.438	1.459	1.436	1.464
	(.210)	(.216)	(.220)	(.236)
AWP regulation (%)	.323	.320	.274	.281
	(.468)	(.467)	(.447)	(.450)
Hospital Characteristics				
Beds	265	282	261	284
	(188)	(195)	(189)	(203)
System member (%)	.528	.573	.552	.571
	(.500)	(.495)	(.498)	(.495)
System scale (staffed beds)	5,404	5,752	5,007	3,955
	(10,872)	(11,250)	(10,581)	(8,891)
For-profit (%)	.158	.164	.163	.116
	(.365)	(.370)	(.369)	(.321)
Government (%)	.086	.096	.087	.115
	(.280)	(.295)	(.282)	(.319)
N	*697*	*593*	*572*	*558*

[a] Standard error in parentheses.

The change in these dependent variables over time will be discussed at length in the results section of this chapter. The change in market structure variables was discussed in

the prior chapter.[105] The main changes in the remaining independent variables over time were that hospitals reduced the number of beds by approximately 8 percent, 18 percent joined hospital systems, and scale of hospital systems that these hospitals were members of nearly doubled.[106]

5. Empirical Specification and Econometric Methods

This section describes the empirical specification and econometric methods for investigating the hospital's choice of physician practice organization in forming hospital-physician supplier networks.

Empirical Specification

Hospital formation of hospital-physician supplier networks is conditional upon market structure, attributes of the individual hospital, and state regulation:

$$y_{it} = y_{it}(f_{it}, z_{it}, u_i) \tag{1}$$

where y_{it} indicates whether or not hospital i chooses a particular form of physician practice organization (e.g., PHO, IPA) in period t, f_{it} is a vector of observed individual firm attributes in period t, z_{it} is a vector of variables exogenous to the firm that can shift the demand curve (e.g., market structure and regulation), and u_i is a vector of unobservable attributes of hospital i that influence the firm's decision to form hospital-physician supplier networks.

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[105]Note that Table 3.5a and 3.5b shows the means for market structure variables across hospitals, not across unique markets as in Chapter 2. Since most markets (i.e., hospital, HMO) have more than one hospital participant, the means for a particular variable in Table 3.5 will differ from those in Chapter 2.

[106]These percentages are from the open-panel PHO sample.

Econometric Methods

The hospital's choice of a particular form of hospital-physician network in period t is driven by changes in behavioral parameters between period $t - 1$ and t. We can rewrite the vector of observable firm and market characteristics from equation (1) as $X = [F\ Z]$, then the choice can be expressed as:

$$y_{it} = \beta x_{it} + u_i + \varepsilon_{it} \qquad (2)$$

with ε_{it} i.i.d. $N(0,\sigma^2)$. It can be shown that a sufficient statistic for the unobservables u_i is $\Sigma_t y_{it}$.[107] Since we are interested in behavior in period t predicated on period $t - 1$ characteristics, it is appropriate to use the conditional density for y_{it} conditional upon $\Sigma_t y_{it}$ to derive the probability that firm i will choose hospital-physician network form y in period t.[108] The conditional density does not depend on the unobservable incidental parameters u_i. Since the corresponding conditional log-likelihood does not depend on the incidental parameters, maximization of the fixed effects likelihood function will give consistent estimators under mild restrictions on the u_i.[109]

The estimator of the probability that firm i chooses y_{it} in period t conditional upon $\Sigma_t y_{it}$ is:

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[107]William H. Greene, Econometric Analysis (1993).

[108]Gary Chamberlain, Analysis of Covariance with Qualitative Data, 47 Rev. Econ. Stat. 1 (1980).

[109]The proposed estimator satisfies the mild restrictions on the rate at which the sequence of incidental parameters is allowed to become unbounded; see E.B. Andersen, Asymptotic Properties of Conditional Maximum Likelihood Estimators, 32 J. Royal Stat. Society (1970), and E.B. Andersen, Asymptotic Properties of Conditional Likelihood Ratio Tests, 66 J. Amer. Stat. Assoc. (1971). No restrictions are placed on the distribution of the u_i; they are instead treated as parameters to be estimated. Unlike the logit estimator, the conditional likelihood estimator for σ^2 is consistent since it includes a correction for degrees of freedom. Unlike OLS, logit estimation produces predicted values within the range zero to one, allowing predicted values to be readily interpreted as probabilities.

$$Prob(y_i \mid \sum_{t=1}^{T} y_{it}) = \frac{e^{(\beta' \sum_{t=1}^{T} x_{it} y_{it})}}{\sum_{d \in A_i} e^{(\beta' \sum_{t=1}^{T} x_{it} d_{it})}} \quad (3)$$

where $A_i = \{(d_{i1}, \ldots, d_{iT}) \mid d_{it} = 0 \text{ or } 1, \text{ and } \Sigma_{t=1}^{T} d_{it} = \Sigma_{t=1}^{T} y_{it}\}$. This is the conditional logit estimator for a fixed effects panel data model.[110] This specification estimates the probability that hospital *i* will choose the form of hospital-physician network conditional upon the first period values of hospital characteristics, market structure, and regulation.

A separate estimation is performed for the hospital's choice of each form of physician practice organization (e.g., open-panel PHO, IPA,). The vector of independent variables x_{it} is:

$$x_{it} = \alpha_1 F_{it} + \alpha_2 H_{it} + \alpha_3 P_{it} + \alpha_4 I_{it} + \alpha_5 R_{it} \quad (4)$$

where F_{it} a vector of hospital firm-specific characteristics, H_{it} a vector of hospital market structure attributes, P_{it} a vector of physician group market structure attributes, I_{it} a vector of health plan market structure attributes, R_{it} a vector of state regulation, for T = 2 time periods.

The most serious problem in modeling hospital choice of hospital-physician network form is that some of the key factors in the decision (e.g., firm strategy) are not observable but are endogenous. This results in biased parameter estimates,[111] which is difficult to resolve and has rarely been addressed in prior cross-sectional studies of hospital contracting for physician services. Cross-sectional studies are also particularly prone to

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[110]Chamberlain, *supra* note 108.

[111]Brent R. Moulton, Random Group Effects and the Precision of Regression Estimates, 32 J. Econometrics 3 (1986).

self-selection bias arising from unobserved factors that influence the survey respondent's choice to participate in the survey. Since there are likely to be important individual effects for the unit of analysis,[112] a fixed effects rather than random effects specification is called for. This study uses fixed effects panel data estimation techniques to address bias from unobservables. In a fixed effects panel data setting, conditional logit (CL) is preferred over multinomial logit (MNL) models since CL is better able to correct for unobserved heterogeneity.[113] The conditional logit specification in equation (3) controls for unobservables by conditioning on the sum of the dependent variable across time; the unobservables are in essence removed through differencing. The parameters of equation (3) are identified since the equation is already in reduced form. The panel data models will make use of change in the configuration of hospital contracting forms to identify the effects of change in individual hospital and market-level characteristics.

CL is preferred over multinomial probit (MNP) since fixed effects panel data MNP models are biased and inconsistent.[114] Panel data estimation generates more efficient estimates than cross-sectional models by increasing the number of degrees of freedom and reducing collinearity.[115] Both CL and MNL suffer from the "independence of irrelevant alternatives" (IIA) property,[116] but IIA is minimized if the different contracting forms are not close substitutes (e.g., if contracting forms differ substantially and

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[112]Estimation of the models for this study for the individual cross-sections has been performed. The signs of several market structure variable coefficients change over time, suggesting that self-selection bias is present in the cross-sectional samples.

[113]Badi H. Baltagi, Econometric Analysis of Panel Data, 1995.

[114]Baltagi, *supra* note 113.

[115]Cheng Hsiao, Analysis of Panel Data, 1986.

[116]G.S. Maddala, Limited Dependent and Qualitative Variables in Econometrics, 1983.

switching costs are high). No cross-form restrictions are imposed in this study since a separate equation is estimated for each form. MNL is relatively robust in many cases where IIA is theoretically implausible.[117]

6. Empirical Results

This section reports two sets of empirical results on the hospital's choice of physician practice organization in forming hospital-physician supplier networks: (1) a descriptive analysis of the transition between forms of physician practice organization, and (2) results of the fixed effects conditional logit estimation of the hospital's choice of physician practice organization, controlling for hospital and market characteristics.

6.1. Transition between Physician Practice Organizational Forms

Hospitals that contracted with physician practices in 1993 could pursue one of three strategies during the time period ending in 1996: they could maintain the initial contracting form (i.e., implement no change), cease operation of the contracting form, or retain the initial form yet adopt an additional form of contracting. While most hospitals chose to adopt a new form of physician practice organization over the period, the degree of change by form was not homogeneous (Table 3.6). Adoption of new forms vastly outnumbered cessation of existing forms in all but two categories, resulting in a net increase in formal contractual arrangements between hospitals and physician practices. Hospital contracting with closed-panel PHOs was virtually unchanged over the period.[118]

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[117]Daniel L. McFadden, Econometric Analysis of Qualitative Response Variables, Handbook of Econometrics, 1984.

[118]This finding is consistent with the case study literature on PHOs, which suggests that while health plans view the potential for stringent selective contracting and peer review in closed physician panels as desirable, hospitals have found it difficult to convince enough physicians to join closed-panel PHOs to

Most closed-panel PHOs are initiated by hospital-affiliated specialist physicians who seek to gain greater bargaining strength with health plans, contributing little to develop the requisite primary care physician networks for managed care contracting.[119] The only other physician practice organizational form that did not become more widely used by hospitals was group practice, which experienced a substantial decline from 1993 to 1996.

Table 3.6: Number of Hospitals Changing their Form of Physician Practice Organization, 1993-96[a]

Form of Physician Practice Organization	Using Form in 1993	Change from 1993 to 1996[b]			Using in 1996
		No change	Ceased Form	Adopted Form[c]	
Network					
Open-panel PHO	126	33	93	604	637
Closed-panel PHO	365	67	298	295	362
IPA	535	354	181	391	745
Integrated					
Group Practice	519	101	418	140	241
None of the above	623				290

[a] Figures are numbers of hospitals in the sample of *N= 1904* hospitals with the contracting form.
[b] Pearson χ^2 test of row and column independence: $p<0.000$ (12 d.f.).
[c] Includes hospitals that had no formal physician contracting in 1993 but adopted a form by 1996.

Change in hospital contracting for physician services is more illuminating when we consider the transition between specific pairs of physician practice organizational forms over time (Table 3.7. Open-panel PHOs were most often replace by closed-panel PHOs. For all other forms, open-panel PHO adoption was by far the most frequent recourse. Open-panel PHOs are relatively easy to initiate -- they are primarily managed care contracting vehicles and do not require consolidation of physician practices or substantial

make them viable managed care contracting entities.

[119] A 1994 survey found that nearly 75 percent of PHOs had panels with more specialist than primary care physicians, while nearly 60 percent had panels composed of less than 35 percent primary care physicians; health plans prefer to contract with panels that have equal or more primary care physicians than specialists. See Abbey & Treash, *supra* note 36.

start-up capital -- and meet with less resistance from physicians than do closed-panels such as hospital sponsored closed-panel PHOs, group practices, and IPAs.

Table 3.7: Hospital Transition between Forms of Physician Practice Organization, 1993-96

	Form Subsequently Adopted by 1996			
1993 Form Ceased by 1996[a]	Open-panel PHO	Closed-panel PHO	IPA	Group Practice
Open-panel PHO (#)	(13)[b c]	71	15	8
Closed-panel PHO	200	(64)	53	21
IPA	63	23	(70)	6
Group Practice	117	58	59	(157)
Open-panel PHO (%)[d]	(.087)	.473	.100	.053
Closed-panel PHO	.435	(.139)	.115	.046
IPA	.281	.103	(.313)	.027
Group Practice	.218	.108	.110	(.292)

[a] Row totals may add up to more than the number Ceased by 1996 from Table 3.6 since hospitals may replace the decommissioned form with more than one other form.

[b] Figures in parenthesis are the number of hospitals that ceased the 1993 form but did not adopt another form.

[c] Pearson χ^2 test of row and column independence: $p<0.000$ (25 d.f.).

[d] The denominator for percentages is the number of forms in 1993 (i.e., row total in absolute value).

Tables 3.5 and 3.6 show that the greatest changes in hospital contracting for physician services involved open-panel PHOs and group practices. These are the contracting forms for which we are most likely to detect statistically significant changes in the estimation of hospital contracting and financial performance models.

6.2. Hospital Choice of Physician Practice Organizational Form

I computed maximum likelihood estimates of the parameters in equation (3) for the panel of 1,904 non-federal acute care hospitals of 25 or more beds in metropolitan areas nationwide in 1993 and 1996 using a fixed effects conditional logit estimator (Table 3.8).[120] The dependent variable is the probability that a hospital will choose the specified

[120] I investigated other variants before choosing the final model. The level of hospital capitation and the HHI for HMO enrollment (instead of HMO penetration and number of HMOs) could not be used due to collinearity with other market structure variables. Adding the variable for specialty care capitation caused

form of physician practice organization instead using another form or procuring services on the spot market. A separate estimation was performed for hospital choice of each form of physician practice organization, with the choice in 1996 conditional upon the hospital's 1993 attributes. Theory suggests that unobservable individual hospital attributes are likely to be correlated with the observable determinants of hospital contracting for physician services. A Hausman specification test[121] can be used to test this presumption. Under the null hypothesis of no correlation between the individual firm effects and the regressors, both the ordinary least squares (OLS) fixed effects model and the generalized least squares (GLS) random effects model are consistent and the coefficient estimates should not differ systematically. The Hausman test strongly rejected the null hypothesis for each of these models.[122] The individual firm fixed effects are significant in this model and in every other specification of the model that was investigated. Unobservable firm-level attributes significantly affect the estimation results, thus fixed effects models should be used instead of random effects models.

Alternative specifications of the model were used to evaluate two variables of interest that are potentially endogenous. It is conceivable that hospitals are more likely to contract for physician services in markets where patient are most severely ill (and hence require more costly health care services) or where labor costs are highest. In both

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primary care physician capitation to lose most of its significance. Teaching status of the hospital added little to the model. Other pertinent forms of regulation, such as corporate practice of medicine and selective contracting, did not change during the study period. Signs were stable, and coefficients and standard errors changed gradually (if at all) as variables were added to the model.

[121] Jerry A. Hausman, Specification Tests in Econometrics, 46 Econometrica 6 (1978).

[122] The Hausman specification test statistics for the seven models in Table 3.8 are $\chi^2(12) = 84.35$, Prob > $\chi^2 = 0.0000$; $\chi^2(12) = 223.14$, Prob > $\chi^2 = 0.0000$; $\chi^2(12) = 35.88$, Prob > $\chi^2 = 0.0003$; $\chi^2(12) = 20.03$, Prob > $\chi^2 = 0.0665$; $\chi^2(12) = 105.89$, Prob > $\chi^2 = 0.0000$; $\chi^2(12) = 186.11$, Prob > $\chi^2 = 0.0000$; $\chi^2(12) = 69.91$, Prob > $\chi^2 = 0.0000$.

situations, hospitals must implement more stringent controls to restrain cost growth. A case mix index is frequently included in models of hospital behavior to control for patient severity of illness as an input to the production process. However, hospitals may be able to influence the mix of patients over time by pursuing different pools of covered lives, either by contracting with different health plans or through different hospital-physician supplier networks. Thus in panel data models of hospital contracting for physician services, case mix may be endogenous. This study found no empirical evidence of endogeneity of case mix; dropping the case mix variable from the model had a negligible influence on the other parameters. However, including market-level wage rates had a dramatic effect on the model. The market wage coefficient was positive and highly significant, while most other parameters had smaller coefficients and substantially higher standard errors than in the original model. There is strong evidence of selection bias in hospital contracting for physician services based on market labor costs. Thus, wage rates could not be included in the adoption models nor in later models of hospital contracting and costs.

Table 3.8: Hospital Choice of Physician Practice Organization, 1993-96 [a]

Variable	Physician Practice Organization: Network: Open PHO	Network: Closed PHO	Network: IPA	Integrated: Group Practice
Market Structure[b]				
HHI hospital admissions	.191e-3	.299e-3 *	.257e-3 *	-.351e-3 **
	(.17e-3)	(.15e-3)	(.15e-3)	(.176e-3)
Prim. care phys. capitated (%)	.369	-.499	.406	-.793 **
	(.351)	(.346)	(.354)	(.370)
Spec. care phys. capitated (%)	1.373 ***	.466	.080	-.585
	(.509)	(.425)	(.455)	(.455)
HMO penetration (%)	7.390 ***	.717	4.916 ***	-2.945 ***
	(1.252)	(.967)	(1.257)	(1.133)
# of HMOs	.154 ***	.020	.016	-.128 ***
	(.033)	(.031)	(.028)	(.030)
Case mix index	1.483	.548	.541	- 1.624
	(1.000)	(1.207)	(1.494)	(1.546)
AWP regulation	.824 ***	-.506 **	.452	-.339
	(.300)	(.254)	(.292)	(.358)
Hospital Characteristics				
Beds	-.004 ***	-.414e-4	-.002	.004 ***
	(.001)	(.001)	(.002)	(.002)
System member	-.116	.566 **	.179	.213
	(.283)	(.266)	(.274)	(.269)
System scale	.199e-4	-.257e-4 **	.110e-4	-.949e-5
	(.15e-4)	(.126e-4)	(1.4e-4)	(.179e-4)
For-profit	.125	-.509	-.469	-.616
	(.603)	(.553)	(.538)	(.553)
Government	-.505	-1.283 **	.008	-.465
	(.671)	(.700)	(.675)	(.808)
N [c]	*1394*	*1186*	*1144*	*1116*
Log Likelihood	*-363*	*-396*	*-369*	*-339*
χ^2	*239*	*29*	*54*	*94*
Prob > χ^2	*.0000*	*.0043*	*.0000*	*.0000*

[a] Standard error in parentheses. Significance levels are 1% (***), 5% (**), and 10% (*).

[b] The correlation between market structure variables was low in each year ($|\rho| < 0.25$ except for primary versus specialty care capitation, where $\rho < 0.60$).

[c] *N* is the number of *observations* in the panel dataset; there is one observation per hospital per year. The number *hospitals* is half the number of observations in the sample.

Hospitals often engage in multiple contracting arrangements for physician services simultaneously, and this severely constrains the ability of cross-sectional studies to unpack the root causes of hospital contracting for physician services. This study takes

advantage of two factors to aid in econometric identification of the causes of this contracting behavior: (1) a panel dataset is employed, so the analysis evaluates how *change* in the independent variables affects *change* in the dependent variable, and (2) the previous section demonstrated that hospitals typically made only one change to their configuration of contracting for physician services over the study period, making it possible evaluate change in individual contracting forms. The conditional logit specification allows us to make inference with respect to signs and significance of coefficients, although the magnitude of the reported unstandardized coefficients cannot generally be compared within or across models (since estimation samples differ for each physician practice organizational form).

Principal Results

Table 3.8 displays the results of the fixed effects conditional logit estimation of the hospital's choice of physician practice organization in building hospital-physician supplier networks. The first column of Table 3.8 identifies the independent variables for each model. The remaining four columns display the results for the four models estimated. The dependent variable is at the top of each column, one for each principal form of physician practice organization (e.g., open-panel PHO). In general, the results provide strong support for the two research hypotheses (see Table 3.3).

Hypothesis 3.1 predicts that hospitals will choose less capital-intensive forms of physician practice organizations to form hospital-physician supplier networks as hospital competition abates. As hospital concentration (measured by the HHI of hospital admissions) rises, hospital competition abates. Network forms of physician practice

organization are considered less capital-intensive to establish than integrated firms, thus hospitals will switch from integrated firms to network firms as hospital concentration rises. As predicted, hospital concentration is positively related to hospital choice of all three network forms (i.e., open-panel PHO, closed-panel PHO, IPA) and negatively related to choice of integrated firms (i.e., group practice). Hospitals need not use capital-intensive forms of contracting to secure physician affiliations in markets with high hospital concentration. By contracting with network firms instead of integrated firms, hospitals make fewer specialized financial capital investments that are at risk of moral hazard.

Hypothesis 3.2 predicts that as market-level investment in cost and quality control rises, hospitals will choose physician practice organizations that are network firms instead of integrated firms in building hospital-physician supplier networks. Market-level investment in cost and quality control is reflected in four measures: the percentage of health plan reimbursements to primary care physician practices that are capitated, the percentage for speciality care practices, HMO penetration, and the number of HMOs. Physician practices strive to develop cost-effective practice patterns and a reputation for high quality to gain competitive advantage in managed care contracting. These investments in intellectual capital are difficult to develop and protect from appropriation. The degree to which these assets are specialized to a particular hospital-physician supplier network falls when competing hospital-physician supplier networks develop similarly stringent methods of cost and quality control. As predicted, all four measures of market-level investment in cost and quality control are positively related to hospital choice of all three network forms of physician practice organization and negatively related to the

choice of integrated firms. The only exception was the negative relationship between primary care physician capitation and choice of closed-panel PHOs, although the coefficient is not significant.

Control Variable Findings

Although no research hypotheses were proposed for the control variables, these variables are frequently investigated in other empirical studies of hospital behavior. Stringent any willing provider (AWP) regulation, which restricts the formation of closed physician panels, had predictable effects. Hospitals choose open-panel PHOs over closed-panel PHOs where stringent AWP regulation was in place. Hospital scale, system membership, and system scale had few effects on hospital choice of physician practice organization. For-profit versus non-profit organization of the hospital was not significant in any model, indicating that their behavior in choosing physician practice organizational forms is similar; this is not surprising since they generally share similar operating characteristics and compete in the same markets. Hospital patient case mix was not significant in any model, and was inversely related to adoption only in the case of group practices. While it has been suggested that certain contracting forms are better able to provide case management services for patients with high severity of illness, there was no evidence of it in these aggregate data.

7. Discussion

While general strategies for integrating physicians into hospital governance have been studied (e.g., participation in hospital budgeting),[123] few empirical studies have examined the determinants of hospital contracting with specific forms of physician practice organizations (e.g., PHO, IPA).[124] No prior study has investigated the determinants of specific forms of hospital contracting for physician services using a multivariate regression model (nor with a panel data model) to control for other factors. This chapter finds that hospitals choose the most cost-effective form of physician practice organization to meet the demand for cost and quality control and competitive conditions of the market. Hospitals make more substantial investments in specialized financial and intellectual capital when competition abates and when market-level demand for cost and quality control rises. Investment in these specialized assets is reflected by the hospital's choice of network versus integrated physician practice firms; integrated firms involve greater specialized investments than network firms. These findings are broadly congruent with the predictions of transaction cost economic theory, although limitations in available data prevent hypothesis testing at the level of individual transactions. The collection of detailed information about individual hospital-physician network supplier transactions – e.g., hospital investments in the physician practice, the number of physicians involved – would be required to allow the type of transaction-specific analysis that is characteristic of empirical research in transaction cost economic theory.

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[123]Mark *et al*, *supra* note 103.

[124]Morrisey, *supra* note 57; Snail & Robinson, *supra* note 18.

CHAPTER 4: RISK SHARING AND THE PURSUIT OF MANAGED CARE CONTRACTS

1. INTRODUCTION

Hospital-physician supplier networks seek managed care contracts as an alternative to fee-for-service contracts, which account for a smaller share of revenues as large employers and other health care purchasers have shifted covered lives toward managed care plans. For the hospital-physician supplier network, managed care contracts differ most importantly in the degree of financial risk shared between the health plan and supplier network. The degree of financial risk is the proportion of potential hospital-physician earnings at risk of loss if the hospital-physician supplier network does not meet the provisions or underlying assumptions in the managed care contract.[125] PPO contracts involve minimal risk sharing while capitated HMO contracts involve the highest degree of risk sharing.[126] Hospital-physician supplier networks also differ in their ability to manage financial risk by virtue of their organizational form, which affects the supplier network's ability to control cost and quality of services and bear financial risk. Differing financial risk-bearing capabilities make of each hospital-physician organizational form the economizing choice for a particular type of managed care contract. The supplier

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[125]Providers negotiate HMO payment rates with health plans based on the expected average cost of patient care (plus a profit margin). The actual cost of patient care is extremely difficult to anticipate since it is subject to many uncertainties, chiefly the severity of illness of patients, the types of health care resources patients will require and the ability of providers to deliver health care services in a cost-effective manner.

[126]Managed care has caused a shift from patient-driven to payer-driven competition, which gives the health plan greater influence than patients in the choice of cost-effective delivery systems. See David Dranove, Mark Shanley, & William D. White, Price and Concentration in Hospital Markets: the Switch from Patient-driven to Payer-driven Competition, 36 J. Law Econ. 1 (1993).

network's success in obtaining managed care contracts affects the number of potential patients, and thus the number of patients admitted to the hospital.

2. PROVIDER-HEALTH PLAN TRANSACTION

In the provider-health plan transaction, the hospital-physician supplier network seeks managed care contracts from health plans, which act as the buyer's agent.[127] Managed care contracts specify the definition of covered individuals and services, organized provider networks, payment and utilization management mechanisms, and dispute resolution procedures.[128] Supplier networks that obtain managed care contracts gain access to large pools of potential patients, increasing the likelihood that the network's hospitals will be able to attract enough patient admissions to cover their high fixed costs. This chapter focuses on the ability of hospitals (within hospital-physician supplier networks) to obtain managed care contracts.

As described earlier,[129] there are three principal types of managed care contracts: (1) PPO, (2) non-capitated HMO and (3) capitated HMO contracts. PPO contracts

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[127]In practice, the hospital-physician supplier network's contractual relationship with a health plan may involve multiple legal covenants between the three parties (i.e., hospital, physician practice and health plan). Regulations make it difficult or illegal for a hospital to accept combined payment for hospital and physician services. For example, thirty-five states have enacted corporate practice of medicine (CPM) statutes that prohibit any entity other than one that is owned and governed exclusively by physicians from practicing medicine, although some states do not strictly enforce these regulations. Under these circumstances, hospitals and physicians routinely jointly negotiate managed care contracts and rates but execute separate agreements with the health plan for hospital and physician services; see Abbey & Treash, *supra* note 36. Where permitted, hospitals and physicians that perform joint managed care contracting may be required to seek special state insurance licensing (e.g., an HMO license). Hospitals and physicians that independently contract with health plans (but have no coordination agreements) have a spot market relationship with each other for the purposes of this study. However, the health plan-hospital and health plan-physician relationships can be arranged through long-term contracts or unified ownership.

[128]See Appendix 3, Managed Care Contract Provisions.

[129]See Chapter 2, section 1, The Rise of Managed Care.

require providers to accept discounted fees (i.e., payment at levels below their usual and customary rates) and utilization management procedures in return for access to a large pool of potential patients. Individuals covered under PPO health insurance plans may use any provider in the PPO network without advance notice, thus providers cannot easily anticipate characteristics of demand. Individuals covered under HMO contracts enroll as members of the HMO network and are assigned to use specific providers (e.g., physician practices, hospitals). HMO contracts implement more stringent controls on use of services and provider payment than PPO contracts. Capitated HMO contracts pay providers a prospectively set budget (on a per member per month basis) to provide the bundle of covered services, which motivates providers to implement the most stringent controls on provider payment and utilization of the three types of managed care contracts.[130]

Provider-health plan managed care contracts are complex relational contracts[131] designed to support long-term relationships under pervasive uncertainty, in contrast to discrete classical contracts[132] where contract terms and contingencies can be completely specified at the time the bargain is struck (i.e., spot market contracts).[133] Physicians

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[130]It is difficult to precisely compare the rates which health plans pay providers for similar services in a particular geographic area under the three main types of managed care contracts. Payment rates vary due differences in the scope of covered services (i.e., the benefit package), the health status of the covered individuals, and the payment methods (e.g., hospital care per day, per case). However, in a particular market PPO payment rates are usually the highest, capitated HMO rates the lowest and non-capitated HMO rates are intermediate.

[131]Charles J. Goetz & Robert E. Scott, Principles of Relational Contracts, 67 Virginia Law Rev. (1981); Williamson, *supra* note 38.

[132]Ian Macneil, Contracts: Adjustment of Long-term Economic Relations under Classical, Neoclassical, and Relational Contract Law, 72 Northwestern Univ. Law Rev. 6 (1978).

[133]The key provisions of relational contracts define (1) contract commencement, duration, and termination; (2) measurement and specificity of products, prices, and quantities; (3) dividing and sharing of obligations, costs, and benefits; and (4) performance monitoring, enforcement of contract terms, and dispute resolution. Appendix 3 explains how managed care contracts embody the provisions of relational

influence the majority of health care resource expenditures,[134] but the performance of individual physicians and entire supplier networks are inherently difficult to monitor and evaluate. Thus, health plans assess the structural attributes of the physician organizations affiliated with hospitals to ascertain the likelihood that they will meet cost and quality targets.[135] The principal structural dimension along which physician practices differ is the internal organization of the physician practice: whether they are organized as contractual networks or integrated firms.

3. Economic Motivation and Hypotheses

Health plans selectively contract with supplier networks based on their quality and price under PPO and HMO contracts, and they negotiate payment formulas that require providers to assume a significant portion of the financial risk associated with the delivery of hospital care. The three principal forms of managed care contracts differ in the degree of financial risk shared with providers: PPO contracts share little financial risk, capitated HMO contracts the most, and noncapitated HMO contracts are intermediate. Also, provider organizations differ in their ability to manage financial risk. The key structural determinants of financial risk bearing ability are: (1) the internal organization of the physician practice organization and (2) the contractual relationship between the hospital and physician practice organization.

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contracts.

[134]Eisenberg, *supra* note 20.

[135]Penner, *supra* note 94; Ed Zalta, Provider Selection Standards as a Quality Indicator, 1 Managed Care Q. 1 (1993).

This chapter uses transaction cost economics theory and principal-agent theory to compare the alternative forms of physician practice organization and hospital-physician contractual relationships. It builds on the framework developed in Chapter 3 for evaluating the performance attributes of network and integrated firms (see Table 3.1 and Table 3.2). Physician practices can be structured as contractual networks or integrated firms, each with different financial risk bearing ability. Hospital-physician contractual relationships in supplier networks can be structured as long-term contracts or unified ownership, and this also influences risk bearing ability. Due to limitations in available data, this study cannot test microanalytic hypotheses based on detailed attributes of individual hospital-physician supplier network transactions that is characteristic of empirical research in transaction cost economics. Data are not available to measure the precise financial risk characteristics of managed care contracts or hospital-physician supplier networks. However, the main types of managed care contracts and discrete structural forms of physician practice organizations can be ordinally ranked by their financial risk characteristics. This chapter develops testable research hypotheses that are consistent with transaction cost economics theory based on these rankings.

3.1. Internal Organization of the Physician Practice

Chapter 3 established that the three main types of network physician organizations (open-panel PHOs, closed-panel PHOs, and IPAs) have similar adaptive capabilities in contrast to integrated firms (i.e., group practices). Network organizations are better able to respond to changes that require autonomous adaptation (i.e., independent action) but worse at coordinated adaptation than are integrated firms.

The risk-sharing ability of a supplier network also stems from the structure of its physician practice organization. A physician practice that shares a high degree of financial risk with a health plan requires a high degree of coordination amongst its physicians to ensure that they act in the best interest of the firm. Integrated firms are better able to instill incentives for group performance and implement administrative controls (e.g., monitoring of physician effort) than network firms.[136] Examination of the trade-offs between moral hazard and risk spreading in partnerships leads to a similar conclusion;[137] in particular, incentives for group performance are stronger in partnerships than in independent practice, but incentives for individual performance are attenuated.[138]

Physicians practicing under fee-for-service insurance are paid their asking price[139] and are not penalized for inappropriate hospitalization. Since they do not share in financial risk and are not exposed to financial loss, they have no incentive to seek production efficiencies.[140] Under managed care insurance, physicians and hospitals enter into risk-sharing agreements to better align economic incentives. Managed care contracts vary in the degree of financial risk shared with providers: PPO contracts involve virtually no risk-sharing, while HMO contracts involve moderate (non-capitated contracts) to high levels

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[136]The scale of physician practice organizations is important, but it does not explain financial risk sharing ability. The mean size of physician groups in the U.S. is 10.5 physicians, with single-specialty and primary care practices somewhat smaller (6.2 and 5.6 physicians, respectively) and multispecialty groups larger (25.4); see AMA, *supra* note 80. The economies of scale in physician practice are thought to be small in comparison to potential gains from coordinating the process of patient care under managed care, although larger groups are better able to spread financial risk; see Pauly, *supra* note 267.

[137]Martin Gaynor & Paul Gertler, Moral Hazard and Risk Spreading in Partnerships, 26 RAND J. Econ. 4 (1995).

[138]Zismer & Lund, *supra* note 81.

[139]In fact, physicians practicing under fee-for-service insurance are often paid according to a fee schedule, but these fees are closer to the physicians' asking price than are fees under alternative contracts.

[140]Soonman Kwon, Structure of Financial Incentive Systems for Providers in Managed Care Plans, 53 Med. Care Rsch. Rev. 2 (1996).

of risk-sharing (capitated contracts). Thus, there is a discriminating alignment between the financial risk-sharing abilities of physician practice organizations and the risk-sharing requirements of managed care contracts (Table 4.1):

Table 4.1: Physician Practice Organization and Risk-Sharing in Managed Care Contracts

		Financial Risk-Sharing		
Asset Specificity	Physician Practice Organization	Low *(PPO contract)*	Medium *(All HMO contracts)*	High *(Capitated HMO contract)*
Low	Network *(Open PHO, Closed PHO, IPA)*	++	*	+
High	Integrated *(Group Practice)*	+	*	++

+ = weak match, ++ = strong match, * = no prediction

Chapter 3 used transaction cost economics[141] to develop the premise that the financial performance of hospitals is related to investment in specialized financial and intellectual capital (i.e., asset specificity) in their physician practice organizations. Hospitals make investments in these specialized assets by their choice of physician practice organization. These specialized assets are the primary means of developing competitive advantage in cost and quality control. Network physician practice organizations make fewer investments in these specialized assets than integrated firms. Thus, network firms are the transaction cost economizing choice for PPO contracts, which do not require high levels of coordination amongst providers or high levels of risk sharing. Conversely, integrated firms are the transaction cost economizing choice for capitated HMO contracts. No

[141]See Williamson, *supra* note 1.

prediction is made for noncapitated HMO contracts (or all HMO contracts combined, as shown in Table 4.1), which require intermediate levels of risk sharing.

Hypothesis 4.1: Hospitals that make higher levels of specialized investments in cost and quality control are more likely to obtain managed care contracts requiring high levels of financial risk sharing than hospitals that make few of these specialized investments.

3.2. Physician Practice Relationship to the Hospital

Hospitals and physician practices are fundamentally different types of firms; they serve technologically distinct roles that require different clinical and managerial expertise. Hospital inpatient facilities are large vertically-integrated organizations designed to coordinate the broad range of resources necessary to treat severely ill patients. The hospital physical plant requires substantial capital investment, and hospitals employ an extensive staff of managers and others who are not directly involved with patient care. Physician practices are generally much smaller firms and less capital-intensive firms than hospitals, are organized as partnerships led by physicians, and employ a less intensive style of medical practice. The hospital's cost and quality control capabilities are largely determined by specialized investments in financial and intellectual capital of the physician practice, whose physicians control most of the resource utilization decisions in the hospital. While hospital financial performance is strongly affected by its physician practices, hospitals have little experience in managing physician practices, and they face a

steep learning curve in gaining expertise in activities traditionally performed by physician practices.[142]

Hospitals establish one of two types of contractual relationships with physician practices for managed care contracting: (1) long-term contract or (2) unified ownership. Since most specialized investments in cost and quality control are a function of the type of physician practice organization, the relationship between the hospital and physician practice does not independently contribute to the development of these specialized assets. However, the hospital-physician practice relationship does influence the management and control of physician practice assets. There is high potential for hospital managers to engage in opportunistic operating and accounting practices between the divisions of the diversified hospital corporation[143] (e.g., hospital inpatient facility and physician practices that are jointly owned). Hospital managers have more discretion over the management of physician practices under unified ownership than long-term contracts.[144]

Unified hospital-physician ownership of physician practices introduces a principal-agent problem that can be explained by "free cash flow" theory[145] – hospital managers reinvest the excess capital of the firm in projects that have lower rates of return than the

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[142]Casalino, *supra* note 30.

[143]Robinson, *supra* note 91.

[144]Most efforts by hospitals to procure physician services result in the formation of loosely structured arrangements between providers to assist in managed care contracting, although some hospitals develop more tightly integrated arrangements to better align economic incentives between the hospital and physicians; see Robinson, *supra* note 44. Physicians only participate to a limited degree in the ownership and governance of hospital-physician contracting arrangements. Even when board membership is evenly divided between the hospital and physicians, hospitals usually retain greater voting rights in return for assuming a larger share of the financial risk for losses. (Erik Pavelka, Andersen Consulting, personal communication, March 5, 1999.)

[145]Adolph A. Berle & Gardner C. Means Jr., The Modern Corporation and Private Property (1932); Michael Jensen & William Meckling, Theory of the Firm: Managerial Behavior, Agency Costs, and Capital Structure, 3 J. Fin. Econ. (1976); Eugene F. Fama & Michael C. Jensen, Separation of Ownership and Control, 26 J. Law Econ. (1983).

cost of capital.[146] When there are plentiful opportunities for positive NPV projects, the acquisition of funds is the focus of access to capital markets. Hospitals are now in mature or declining markets where there are few positive NPV opportunities, thus the focus is more on return of funds to stakeholders than access to capital.[147] Hospital managers are more likely to invest in projects that do not maximize the value of the physician practice under unified ownership arrangements than under long-term contracts.[148] Managed care contracts that share high degrees of financial risk with the supplier network place a greater share of funds at the discretion of hospital-physician supplier network managers than low risk-sharing contracts. The relationship between hospital managerial discretion in the hospital-physician practice relationship and financial risk sharing in managed care contracts is shown in Table 4.2:

Table 4.2: Hospital-Physician Practice Relationship and Risk-Sharing in Managed Care Contracts

		Financial Risk-Sharing		
Hospital Managerial Discretion	Hospital-Physician Practice Relationship	Low *(PPO contract)*	Medium *(All HMO contracts)*	High *(Capitated HMO contract)*
Low	Long-term contract	+	*	++
High	Unified ownership	++	*	+

+ = weak match, ++ = strong match, * = no prediction

[146]Jensen defines "free cash flow" as cash flow in excess of that required to fund all of a firms's projects that have positive net present value (NPV) when discounted at the relevant cost of capital.

[147]Robert T. Kauer & J.B. Silvers, Hospital Free Cash Flow, 16 Health Care Mgmt Rev 4 (1991).

[148]In addition to the relationship between the hospital and physician practice, free cash flow arguments could be based on the corporate organization of the hospital. Most hospitals are nonprofit (i.e., tax exempt corporations) that face strong restrictions (e.g., private inurement) on returning funds to corporate stakeholders.

Thus, long-term contract arrangements between the hospital and physician practice are better suited to high risk-sharing contracts than low risk-sharing contracts. Unified ownership arrangements between the hospital and physician practice are better suited to low risk-sharing contracts than high risk-sharing contracts.

Hypothesis 4.2: Hospitals are more likely to obtain managed care contracts requiring high levels of risk sharing as hospital managerial discretion over physician practices is reduced.

The ramifications of the incentive compatibility problems inherent to firms are described by principal-agent theory and transaction cost economics.[149] Both focus on how managerial discretion impedes profit maximization objectives of the firm, although agency theory refers to moral hazard and agency costs while transaction cost economics speaks of transaction costs arising from opportunism.[150] Agency costs include monitoring expenditures of the principal, bonding expenditures by the agent, and the residual loss. Transaction costs include the costs of setting up and running governance structures (e.g., planning, negotiation, monitoring), bonding costs of secure commitments (e.g., transaction-specific investments, exchange of "hostages"), costs of maladaptation due to misalignment of incentives between contracting parties over time, and haggling costs to correct incentive misalignment. Each theory maintains that it is too costly if not impossible for each party to perfectly monitor the other,[151] so the parties seek to address

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[149]Oliver E. Williamson, Corporate Finance and Corporate Governance, 43 J. Fin. 3 (1988).

[150]Williamson, *supra* note 38.

[151]Bengt Holmström & Jean Tirole, The Theory of the Firm, in Handbook of Industrial Organization (1990); Bengt Holmström, Moral Hazard and Observability, 10 Bell J. Econ. 1 (1979); David E. M. Sappington, Incentives in Principal-Agent Relationships, 5 J. Econ. Persp. 2 (1991); Williamson, *supra* note 38.

problems through efficient contracting mechanisms.[152] The characteristic behavior of the parties are generally assumed to be known in agency theory, so mechanisms can be designed into contracts *ex ante* to address potential agency costs.[153] Transaction cost economics acknowledges that incentive and control mechanisms can be designed into contracts, but focuses on *ex post* governance provisions to address the many contingencies that cannot be known in advance. Change in market environments over time causes explicit contract provisions to become outdated and inefficient, creating incentive misalignment. Parties to the contract also learn how to subvert the original provisions for their own gain over time. Relying on *ex ante* mechanisms alone invites contract termination or costly renegotiation at renewal. Managed care contracts involve a combination of *ex ante* contract provisions and *ex post* governance mechanisms. The inherently incomplete nature of health care contracts argues for viewing them as governance structures instead of state-contingent contracts.[154]

4. Data and Predicted Coefficients

The models in this chapter use the data from the American Hospital Association, Health Care Financing Administration, and state regulatory information as described in Chapter 3 and Appendix 1. The data have binary indicators of most hospital

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[152]Oliver E. Williamson, *supra* note 149; R. Preston McAfee and John McMillan, Incentives in Government Contracting (1988); Jean-Jacques Laffont & Jean Tirole, A Theory of Incentives in Procurement and Regulation (1993).

[153]Sanford Grossman & Oliver Hart, Corporate Financial Structure and Managerial Incentives, in Perspectives on the History of Economic Thought, vol. 2, 1989; Oliver Hart, Incomplete Contracts and the Theory of the Firm, 4 J. Law Econ. Org. 1 (1988).

[154]Thomas G. McGuire & Michael H. Riordan, The Industrial Organization of Health Care, 3 J. Econ. & Mgt. Strat. 1 (1994).

characteristics of interest to this study. For example, the data indicate whether a hospital-physician supplier network contracts with a group practice and whether the relationship is a long-term contract or unified ownership, but they do not provide detailed data on the employment relationship within the physician practice organization (e.g., number of physicians, payment mechanisms). Thus, this study cannot conduct the type of transaction-specific microanalytic hypothesis testing that is characteristic of empirical research in transaction cost economics and principal-agent theory. However, data are available to test hypotheses based on hospital-level composite measures of the physician practice employment relationship (i.e., network versus integrated firm), which is a primary determinant of the ability to bear financial risk. Every multivariate regression analysis in this study uses fixed effects panel data estimation techniques to control for unobserved heterogeneity at the level of the firm. Because fixed effects panel data techniques are used, every model investigates how the *change* in the independent variables affects *change* in the dependent variable.

In the models of hospital success in obtaining managed care contracts (and patients) presented in this chapter, four different dependent variables are investigated. Three models are used to determine the probability that a hospital-physician supplier network will obtain the principal types of managed care contracts (i.e., PPO, HMO, and capitated HMO contracts). A fourth model is used to investigate the logarithm of the number of hospital patients that a supplier network obtains. All four models have dichotomous independent variables representing the four principal forms of physician practice organization (i.e., open-panel PHO, closed-panel PHO, IPA, group practice) used in building the hospital-physician supplier network, the relationship of the physician

practice organization to the hospital (i.e., long-term contract or unified ownership), and several other hospital characteristics.

Predictions

Hypothesis 4.1 predicts that hospitals that make higher levels of specialized investments in cost and quality control are more likely to obtain managed care contracts requiring high levels of financial risk sharing than hospitals that make few of these specialized investments. Network physician practices are firms with lower investments in these specialized assets than integrated firms. Thus, hospitals are most likely to obtain managed care contracts with low levels of risk sharing (i.e., PPO contracts) if choose network physician practice organizations. Hospitals are more likely to obtain managed care contracts with high levels of risk sharing (i.e., capitated HMO contracts) if choose integrated physician practice firms.

Hypothesis 4.2 predicts that hospitals are more likely to obtain managed care contracts requiring high levels of risk sharing as hospital managerial discretion over physician practices is reduced. Long-term contractual relationships between hospitals and physician practices are associated with lower levels of managerial discretion than unified ownership arrangements.

Table 4.3 summarizes the hypothesized signs of coefficients of key variables in models of the hospital's success in obtaining managed care contracts from health plans.

Table 4.3: Predicted Coefficients for Hospital Success in Managed Care Contracting

Dependent Variable	Predicted Magnitude of Independent Variables[a]	Hypothesis
PPO Contract		
	Open-panel PHO > Group practice	4.1
	Closed-panel PHO > Group practice	4.1
	Independent Practice Association > Group practice	4.1
	Unified ownership > Long-term contract	4.2
Capitated Contract		
	Open-panel PHO < Group practice	4.1
	Closed-panel PHO < Group practice	4.1
	Independent Practice Association < Group practice	4.1
	Unified ownership < Long-term contract	4.2

[a] *Network* physician practice organization models have independent variables Open-panel PHO, Closed-panel PHO, and IPA; *Integrated* models have the independent variable Group practice.

Table 4.3 can be interpreted as follows. Hospitals will be more successful in obtaining PPO contracts when they choose open-panel PHOs instead of physician group practice firms, thus the coefficient for open-panel PHOs will be larger in magnitude than the coefficient for group practices.

The models include independent variables to control for other important firm-level and market characteristics, although no hypotheses are offered for these control variables in an effort to keep the analysis focused on the principal economic phenomena of interest. These control variables include a binary indicator of the presence of state-level any willing provider (AWP) regulation and a variety of hospital attributes: a binary indicator of hospital membership in a multihospital system, the case mix index of average patient severity of illness, and binary indicators of whether the hospital is a for-profit corporation or government entity (omitted category: non-profit corporation).[155]

[155]The variables and data sources are described in detail in Appendix I, Data Sources.

Descriptive Statistics

Tables 3.4a and 3.4b report means and standard deviations for variables in the models based on the panel of 1,904 hospitals operating in 1993 and 1996 that met the study criteria.[156] The columns labeled "PPO Contract," "HMO Contract" and "Capitated Contract" correspond to the three models designed to predict the probability that a hospital-physician supplier network will obtain these types of contracts. The column labeled "Hospital Patients" corresponds to the model designed to predict the number of patients that a supplier network obtains. With the exception of the case mix index, all variables are dichotomous. Thus, the means of the dichotomous variables represent the percentage of hospitals with the characteristic indicated by the variable (e.g., 27.6 percent of hospitals have a group practice in the sample used for the PPO Contract model). The means for the independent variables are similar across models since the samples for the models differ by only a few observations.

[156]Sample selection criteria are described in detail in Appendix I.

Table 4.4a: Descriptive Statistics, 1993[a]

Variable	PPO Contract	HMO Contract	Capitated Contract	Hospital Patients
Dependent variable	.845 %	.799 %	.277 %	9,929.9
	(.361)	(.400)	(.448)	(7,818.8)
Physician Practice Organization				
Network				
Open-panel PHO (%)	.069	.069	.073	.066
	(.255)	(.253)	(.260)	(.248)
Closed-panel PHO (%)	.197	.196	.204	.191
	(.398)	(.397)	(.403)	(.393)
Independent Practice Assn. (%)	.281	.283	.300	.280
	(.450)	(.450)	(.458)	(.449)
Integrated				
Group practice (%)	.276	.277	.297	.272
	(.447)	(.447)	(.457)	(.445)
Relationship to Hospital				
Long-term contract (%)	.252	.257	.272	.252
	(.434)	(.437)	(.497)	(.434)
Unified ownership (%)	.431	.429	.453	.423
	(.495)	(.495)	(.497)	(.494)
Hospital Characteristics				
System member (%)	.439	.439	.435	.443
	(.496)	(.496)	(.495)	(.496)
For-profit (%)	.136	.135	.125	.138
	(.343)	(.342)	(.331)	(.345)
Government (%)	.154	.154	.156	.156
	(.361)	(.361)	(.363)	(.363)
Market Structure				
Case mix index	1.409	1.410	1.411	1.404
	(.223)	(.223)	(.224)	(.222)
Any Willing Provider regulation (%)	.178	.178	.175	.174
	(.382)	(.382)	(.380)	(.379)
N	*1903*	*1902*	*1893*	*1904*

[a] Standard deviation in parentheses.

Table 4.4b: Descriptive Statistics, 1996*

Variable	PPO Contract	HMO Contract	Capitated Contract	Hospital Patients
Dependent variable	.925 %	.905 %	.181 %	10,119.7
	(.263)	(.292)	(.385)	(8,106.3)
Physician Practice Organization				
Network				
Open-panel PHO (%)	.345	.342	.342	.334
	(.475)	(.474)	(.474)	(.471)
Closed-panel PHO (%)	.194	.193	.198	.190
	(.396)	(.394)	(.399)	(.392)
Independent Practice Assn. (%)	.399	.400	.391	.391
	(.489)	(.490)	(.488)	(.488)
Integrated				
Group practice (%)	.130	.131	.126	.126
	(.336)	(.337)	(.332)	(.332)
Relationship to Hospital				
Long-term contract (%)	.144	.143	.143	.140
	(.351)	(.350)	(.350)	(.347)
Unified ownership (%)	.774	.775	.774	.761
	(.417)	(.417)	(.417)	(.426)
Hospital Characteristics				
System member (%)	.515	.515	.506	.517
	(.499)	(.499)	(.500)	(.499)
For-profit (%)	.152	.151	.141	.154
	(.359)	(.359)	(.349)	(.361)
Government (%)	.140	.141	.144	.142
	(.348)	(.348)	(.351)	(.350)
Market Structure				
Case mix index	1.425	1.427	1.428	1.423
	(.222)	(.223)	(.223)	(.222)
Any Willing Provider regulation (%)	.310	.308	.308	.301
	(.463)	(.462)	(.462)	(.459)
N	*1903*	*1902*	*1893*	*1904*

* Standard deviation in parentheses.

As in Chapter 3, it is evident that many hospitals shifted from group practices to PHOs and IPAs over the period 1993-96. The vast majority of hospitals already had PPO and HMO contracts in 1993 (84.5 and 79.9 percent, respectively), although the proportion of hospitals with these contracts increased over the period (by 9.5 and 13.3 percent, respectively). The number of hospitals with capitated HMO contracts decreased from 27.7 percent to 18.1 percent over the period, while the number of hospital patients

declined less than 2 percent.

Statistics on the proportion of HMOs that contract with hospital-physician supplier network organizations are less complete. Prior to the rapid expansion of hospital contracting for physician services in the 1990s, HMOs contracted primarily with physician group practices and IPAs. Although three-fourths of HMOs still contract with group practices, more than half also now contract with PHOs (Table 4.5).

Table 4.5: HMO Contracting with Physician Organizations and Organized Delivery Systems,[a] 1996[b]

Physician Organization	% of HMOs Contracting with Phys. Org.	Median # of Contracts	Median # of Covered Lives	Median # of Capitation Contracts	Median # of Capitated Covered Lives
Large Multispecialty Group Practice	76.7	3	13,570	2	10,000
Physician-Hospital Org. (PHO)	56.6	3	5,000	2	7,456

[a] Multispecialty group practices may be formed by physicians or a hospital.
[b] Source: InterStudy, April 1997.

Furthermore, the American Medical Association estimated that half of the nation's 600,000 physicians negotiated with health plans through an IPA in 1996.[157]

5. Empirical Specification and Econometric Methods

This section describes the empirical specification and econometric methods for investigating the hospital-physician supplier network's success in obtaining managed care contracts from health plans and in obtaining hospital patients.

[157] Jaklevic, *supra* note 58.

Empirical Specification

Hospital-physician supplier network success in obtaining managed care contracts is conditional upon the type of physician practice organization, attributes of the individual hospital, and state regulation:

$$y_{it} = y_{it}(f_{it}, z_{it}, u_i) \tag{5}$$

where y_{it} indicates whether or not supplier network i obtains a particular type of managed care contract (e.g., PPO, HMO) in period t, f_{it} is a vector of observed individual firm attributes in period t, z_{it} is a vector of variables exogenous to the firm that can shift the demand curve (e.g., market structure and regulation), and u_i is a vector of unobservable attributes of hospital i that influence the firm's decision to form hospital-physician supplier networks.

Econometric Methods

Two variations on equation (5) are used to estimate the models of hospital success in obtaining managed care contracts and hospital patients. The dependent variables $\boldsymbol{CON}_{it}$ are binary indicators of whether the hospital has obtained PPO, HMO, and capitated HMO contracts, and z_{it} is a vector of hospital and regulatory characteristics:

$$\boldsymbol{CON}_{it} = \alpha_i z_{it} + u_i + \varepsilon_{it} \tag{6}$$

Except for regulatory characteristics, these models exclude the market condition regressors for the models of hospital choice of physician practice organization in Chapter 3. The market condition variables influence both the hospital choice of physician practice organization and success in obtaining managed care contracts. Sufficient data are not available to resolve the potential endogeneity caused by including both the market

characteristics and hospital choice of physician practice organization as regressors, so the reduced form equation (6) is estimated. Equation (6) is estimated using a fixed effects logit model

The second type of equation has the logarithm of patient admissions to the hospital as the dependent variable and the same independent variables as equation (6):

$$ln\ PAT_{it} = \alpha_1 z_{it} + u_i + \varepsilon_{it} \quad (7)$$

As discussed in Chapter 3, the most serious problem in modeling hospital behavior is that some of the key factors in the decision (e.g., firm strategy) are not observable but are endogenous. The models in this chapter are estimated using fixed-effects panel data techniques to resolve the potential bias from unobservable individual hospital-level characteristics.

6. Empirical Results

6.1. Managed Care Contracts

I computed fixed effects estimates of the parameters in equation (6) and fixed effects logit estimates of the parameters in equation (7) for the panel of 1,904 non-federal acute care hospitals of 25 or more beds in metropolitan areas nationwide in 1993 and 1996 (Table 4.6). The dependent variable in equation (6) is the probability that a hospital will obtain the indicated type of managed care contract (PPO, HMO, capitated HMO). A separate estimation was performed for hospital choice of each form of managed care contract, with the choice in 1996 conditional upon the hospital's 1993 attributes. The dependent variable in equation (7) is the logarithm of the number of hospital

admissions.[158] Theory suggests that unobservable individual hospital attributes are likely to be correlated with the observable determinants of hospital managed care contracting. A Hausman specification test[159] can be used to test this presumption. Under the null hypothesis of no correlation between the individual firm effects and the regressors, both the ordinary least squares (OLS) fixed effects model and the generalized least squares (GLS) random effects model are consistent and the coefficient estimates should not differ systematically. The Hausman specification test for the significance of individual firm effects was highly significant in all models except PPO contracting.[160] Unobservable firm-level attributes significantly affect the estimation results, thus fixed effects models should be used instead of random effects models.

A hospital's managed care contracting activity can be measured by the hospital's ability to obtain PPO, HMO, and capitated HMO contracts with health plans. PPO contracts transfer very little financial risk from the health plan to providers. Non-capitated HMO contracts and capitated HMO contracts transfer increasing levels of risk to providers and impose more stringent payment and utilization management methods. Health plans are more selective in choosing providers when they transfer higher levels of risk, and they are more likely to delegate utilization management responsibilities to providers who can achieve more stringent cost and quality control.

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[158]A specification of the model that included hospital scale (i.e., beds) was estimated, but it had a negligible effect on the other parameters. Since hospital scale does not change substantially over time it is more important in cross-sectional than panel fixed effect models.

[159]Hausman, *supra* note 121.

[160]The Hausman specification test strongly rejects the random effects specification in all but the PPO contracting model. The test results are (PPO) $\chi^2(13) = 15.11$, Prob > $\chi^2 = 0.3003$; (HMO) $\chi^2(13) = 47.59$, Prob > $\chi^2 = 0.0000$; (Capitated) $\chi^2(13) = 62.77$, Prob > $\chi^2 = 0.0000$; (Patients) $\chi^2(13) = 1424.48$, Prob > $\chi^2 = 0.0000$.

Table 4.6: Effects of Physician Practice Org. on Success in Managed Care Contracting, 1993-96[a]

Variable	*Managed Care Contract* PPO Contract	HMO Contract	Capitated Contract	Hospital Patients (ln)
Physician Practice Organization				
Network				
Open-panel PHO	.056 ***	.018	-.025	-.008
	(.019)	(.020)	(.027)	(.010)
Closed-panel PHO	.022	-.007	.022	-.002
	(.020)	(.021)	(.027)	(.010)
Independent Practice Assn.	.032 *	.036 *	-.050 *	.024 **
	(.019)	(.021)	(.027)	(.010)
Integrated				
Group practice	-.034 *	-.042 **	.065 **	.005
	(.019)	(.020)	(.026)	(.009)
Relationship to Hospital				
Long-term contract	.010	.022	.049 *	.004
	(.020)	(.021)	(.027)	(.010)
Unified ownership	.062 ***	.085 ***	-.006	.017 *
	(.018)	(.019)	(.025)	(.010)
Hospital Characteristics				
System member	.038	.017	-.042	-.001
	(.029)	(.031)	(.041)	(.014)
For-profit	-.073	-.018	-.138 *	-.070 ***
	(.054)	(.058)	(.077)	(.027)
Government	-.011	.033	.015	.017
	(.063)	(.067)	(.094)	(.031)
Market Structure				
Case mix index	.229 *	.398 ***	-.509 ***	-.235 ***
	(.137)	(.139)	(.176)	(.064)
Any Willing Provider regulation	.028	.125 ***	-.113 ***	.028 **
	(.027)	(.029)	(.037)	(.014)
Intercept	.483 **	.181	1.011 ***	9.198 ***
	(.194)	(.196)	(.250)	(.091)
N	*3806*	*3804*	*3786*	*3808*
R^2	*.039*	*.020*	*.003*	*.170*
Prob > F	*.000*	*.000*	*.000*	*.000*
$Corr(u_i, X\beta)$	*-.086*	*-.242*	*-.469*	*-.469*

[a] Standard error in parentheses. Significance levels are 1% (***), 5% (**), and 10% (*). Corrections to dummy variable coefficients for their estimated variance in semilogarithmic equations (Kennedy, 1981) were negligible.

Hospitals often engage in multiple contracting arrangements for physician services simultaneously, and this severely constrains the ability of cross-sectional studies to unpack the effects of hospital contracting for physician services. This study takes advantage of two factors to aid in econometric identification of the causes of this contracting behavior: (1) a panel dataset is employed, so the analysis evaluates how *change* in the independent variables affects *change* in the dependent variable, and (2) the previous section demonstrated that hospitals typically made only one change to their configuration of contracting for physician services over the study period, making it possible evaluate change in individual contracting forms. The conditional logit specification for equation (7) allows us to make inference with respect to signs and significance of coefficients, although no specific predictions are made for the hospital's ability to obtain patient admissions.

Principal Results

Table 4.6 displays the results of the fixed effects estimation of equations (6) and (7). The first column of Table 4.6 identifies the independent variables for each model. The remaining four columns display the results for the four models estimated. The dependent variable is at the top of each column, one for each principal form of managed care contract (PPO, HMO, capitated HMO) and one for the logarithm of the number of hospital admissions. In general, the results support for the two research hypotheses (see Table 4.3). The relative magnitude of all of coefficients for physician practice organization and relationship to the hospital agreed with the predictions, although not all the coefficients were statistically significant.

Hypothesis 4.1 predicts that hospitals that make higher levels of specialized investments in cost and quality control are more likely to obtain managed care contracts requiring high levels of financial risk sharing than hospitals that make few of these specialized investments. As described in Chapter 3, hospitals make investments in these specialized assets by their choice of physician practice organization. Network physician practice organizations (i.e., open-panel PHO, closed-panel PHO, IPA) represent low levels of investment in these specialized assets, while integrated firms (i.e., group practice) represent high levels. As predicted, network firms are the transaction cost economizing choice for PPO contracts, which do not require high levels of coordination amongst providers or high levels of risk sharing. Two of the three network forms and the one integrated firm coefficient were statistically significant. Hospitals that adopted open-panel PHOs were 9 percent more likely to obtain a PPO contract than those that adopted an integrated group practice physician organization. Hospitals that adopted an IPA were 6.6 percent more likely to obtain a PPO contract than those adopting integrated physician practice firms.

Also as predicted, integrated firms are the transaction cost economizing choice for capitated HMO contracts. Integrated firms are better able to implement stringent cost and quality control of than network physician practice organizations. Here, one of the network forms and the integrated firm coefficients were statistically significant. Hospitals adopting group practices were 11.5 percent more likely to obtain a capitated HMO contract than those adopting an IPA. No prediction was made for noncapitated HMO contracts (or all HMO contracts combined, as shown in Table 4.1), which require intermediate levels of risk sharing.

Hypothesis 4.2 predicts that hospitals are more likely to obtain managed care contracts requiring high levels of risk sharing as hospital managerial discretion over physician practices is reduced. In all cases, the relative magnitude of the coefficients for the relationship to the hospital agreed with the predictions. While only one of the two coefficients was statistically significant in each model, tests of the null hypothesis that the two coefficients were equal were rejected for each model. As predicted, hospitals that enter into unified ownership arrangements with physician practices were more successful in obtaining PPO contracts than those that procured physician services through long-term contracts.[161] However, unified ownership reduced the likelihood of obtaining the more stringent capitated HMO contracts, as predicted.[162] This is consistent with the presumption that, controlling for the hospital's choice of physician practice organization, hospital managers are more likely to invest in projects that do not maximize the value of the physician practice under unified ownership arrangements than under long-term contracts.

Control Variable and Other Results

No research hypotheses were proposed for the number of hospital patients or the control variables in each model. Hospitals contract for physician services in part to protect market share in patient admissions. However, hospital contracting for physician services had little effect on the hospital's ability to obtain patient admissions (Table 4.6,

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[161] A test of the null hypothesis in the PPO and HMO contract models that the own and long-term contract coefficients were equal was strongly rejected with $F(1, 1774) = 4.81$, $Prob > F = 0.0284$ and $F(1,1783) = 4.62$, $Prob > F = 0.0318$ respectively.

[162] A test of the null hypothesis in the capitated contract model that the own and long-term contract coefficients were equal was strongly rejected with $F(1, 1670) = 4.07$, $Prob > F = 0.0439$.

"Hospital Patients (ln)" column). Only IPAs improved the hospital's volume of patient admissions (by 2.4 percent), while coefficients for all other forms of hospital contracting for physician services were near zero and not statistically significant. Unified ownership helped hospitals obtain more patient admissions, but the relationship between long-term contracting and admissions was not statistically significant. Hospitals with more severely ill patients (as measured by the case mix index) were more likely to obtain PPO contracts but less likely to obtain capitated HMO contracts compared to hospitals with less severely ill patients.

7. Discussion

For the hospital-physician supplier network, managed care contracts differ most importantly in the degree of financial risk shared between the health plan and supplier network; PPO contracts involve minimal risk sharing, while capitated HMO contracts involve the highest degree of risk sharing. Hospital-physician supplier networks differ in their ability to manage financial risk by virtue of their form of physician practice organization and its relationship to the hospital. Integrated firms are better able to manage risk than network firms since they make more substantial investments in specialized assets to control cost and quality. Long-term contractual relationship between the hospital and physician practice are better able to manage risk than unified ownership arrangements since they are subject to a lower level of hospital managerial discretion. This study finds a discriminating alignment between the risk-sharing abilities of hospital-physician supplier networks and the risk-sharing characteristics of managed care contracts. Hospitals that contract for physician services through integrated firms or long-

term contracts are more likely to obtain high risk-sharing (i.e., capitated HMO) contracts. Conversely, hospitals that contract for physician services through network firms or unified ownership arrangements are more likely to obtain low risk-sharing (i.e., PPO) contracts.

The results are qualitatively consistent with a recent unpublished study of the effects of hospital contracting for physician services on the hospital's ability to obtain managed care contracts under various market conditions by Bazzoli *et al.*[163] Hospitals using a mix of "tightly" and "loosely-integrated" contracting arrangements for physician services were more likely to have capitated HMO contracts and larger capitated contracts than those using only one of the these types of arrangements. Hospitals are multiproduct firms that typically conduct business with multiple physician practice organizations and health plans, each with different degrees of experience in managed care contracting and cost and quality control. The results imply that contracting strategies are most effective when matched to pertinent hospital characteristics and market structure (e.g., demand for stringent cost and quality control), and that it is unlikely that a single form of hospital contracting for physician services will suffice in any market. Methodological differences make it difficult to draw other comparisons with the Bazzoli study. The results were reported for the authors' composite categories of contracting arrangements and were not disaggregated to reveal the effects of individual forms of contracting for physician services. The composite categories ("tightly" and "loosely" integrated) reflect a blend of

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[163]Results of probit models of capitated contracting in 1995 for hospitals that had physician-hospital arrangements in 1993; data are from a proprietary survey of 512 hospitals. "Loosely-integrated" corresponds to PHOs, IPAs, and group practices; "tightly-integrated" to MSOs, medical foundations, and fully vertically-integrated arrangements. See Bazzoli, Dynan & Burns, *supra* note 70.

the physician practice organization and its relationship to the hospital, dimensions which this study found to be independently significant. Furthermore, the "loosely-integrated" category contains integrated physician practice firms as well as non-integrated network firms. The "tightly-integrated" category primarily consists of organizations that virtually always accompany one of the four principal forms of physician practice organization: open and closed-panel PHOs, IPAs and group practices.[164]

While this study's findings are consistent with the predictions of transaction cost economic theory and principal-agent theory, limitations in available data prevent tests of hypotheses based on detailed attributes of individual transactions. Microanalytic data on the financial risk characteristics of managed care contracts and hospital-physician supplier networks will be necessary to conduct the type of transaction-specific analysis that is typical of empirical research in transaction cost economics and principal-agent theory.

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[164]See *supra* note 57.

CHAPTER 5: HOSPITAL-PHYSICIAN COORDINATION AND HOSPITAL COST CONTAINMENT

1. INTRODUCTION

The ultimate objective of hospital contracting for physician services is to control the growth of hospital costs and to raise revenues (e.g., via higher volume of services). The hospital's choice of physician practice organization is the principal determinant of the hospital's ability to control the quality of care and hospital total operating costs. The form of physician practice organization affects the level of specialized investments in cost and quality control, and the different organizational forms have different effects on the components of hospital total cost growth. The relationship between the hospital and physician practice also affects hospital cost growth. Unified ownership introduces a principal-agent problem that reduces the hospital's ability to control costs compared to hospital procurement of physician services through long-term contracts.

2. HOSPITAL-PHYSICIAN PRACTICE COORDINATION TRANSACTION

In the hospital-physician practice coordination transaction, hospitals and physician practices coordinate the delivery of services of the two organizations to control the cost and quality of hospital services. The development of hospital-physician supplier networks to seek managed care contracts (i.e., the transaction in Chapter 4) focuses mostly on *ex ante* characteristics of the supplier network. But both *ex ante* hospital-physician contract provisions and *ex post* governance influence hospital costs. Once

hospital-physician supplier networks obtain managed care contracts, they must concentrate on controlling the cost and quality of health care services delivered to patients covered by the contracts. Physicians are rarely hospital employees but control most resource utilization decisions;[165] physicians make the decision to admit a patient to the hospital, and the physician's choice of treatment protocol (e.g., medical or surgical intervention, inpatient or outpatient care) has enormous hospital resource implications. Hospitals primarily contract for physician services through physician practice organizations rather than directly with individual physicians, whereas patient treatment decisions are made by the individual physicians. Hospitals control costs associated with physician services primarily through mechanisms operating at the level of the firm -- hospitals selectively contract with cost-effective physician practices and coordinate the delivery of services between the hospital and physician practice.

3. Economic Motivation and Hypotheses

Hospital cost control capabilities are primarily influenced by the key dimensions of hospital-physician supplier networks: (1) the type of physician practice organization (i.e., a network or integrated firm) and (2) the contractual relationship between the hospital and physician practice (i.e., long-term contract or unified ownership). The type of physician practice organization affects the economic incentives of physicians, while the relationship between the hospital and physician practice affects the ability of hospital managers to exercise discretion over investments in physician practices. Hospitals have four principal

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[165]Eisenberg, *supra* note 20.

organizational alternatives for contracting with physicians under managed care: (1) open-panel PHOs, (2) closed-panel PHOs, (3) IPAs and (4) group practices. The relationship between the hospital and physician practice organization is structured either through unified ownership or long-term contract.

This chapter uses transaction cost economics theory and principal-agent theory to compare the alternative forms of physician practice organization and hospital-physician contractual relationships. It builds on the transaction cost framework developed in Chapter 3 for evaluating the performance attributes of network and integrated firms (see Table 3.1 and Table 3.2), and the principal-agent theory ramifications of the physician practice relationship to the hospital developed in Chapter 4. Physician practices can be structured as contractual networks or integrated firms, each with different ramifications for hospital cost control. The structuring of hospital-physician contractual relationships as long-term contracts or unified ownership also influences hospital costs. Due to limitations in available data, this study cannot test microanalytic hypotheses based on detailed attributes of individual hospital-physician supplier network transactions that is characteristic of empirical research in transaction cost economics. Data are not available to measure individual cost and quality control mechanisms of physician-hospital supplier networks (e.g., payment mechanisms). However, the discrete structural forms of physician practice organizations can be ordinally ranked by their cost control characteristics. This chapter develops testable research hypotheses that are consistent with transaction cost economics theory based on these rankings.

3.1. Internal Organization of the Physician Practice

Spot market procurement of physician services under FFS insurance arrangements provides few incentives for physicians to seek efficiencies in hospital production since they are paid their asking price. Major regulatory changes in payment mechanisms and widespread expansion of managed care in the 1980s and early 1990s were associated with rapid reductions in hospital length of stay (see Table 2.1), although their effects diminished over time as health care providers learned how to maximize reimbursement in the new environment.[166] Under managed care providers share financial risk for the cost of patient care and payment rates are lower than under FFS, thus hospitals have strong incentives to selectively contract with physicians and implement incentive mechanisms and administrative controls that encourage cost-conscious behavior.[167] Recent empirical studies[168] suggest that there are still substantial efficiencies to be gained through better coordination of the production of hospital services.[169]

The primary means by which physicians can reduce hospital total costs are to: (1) reduce the volume of service (i.e., hospitalization rate), (2) reduce the intensity of service

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[166]In particular, the implementation of the Prospective Payment System for Medicare caused a sharp drop in hospital inpatient length of stay and hospital costs, but the rate of growth of hospital costs was largely unchanged.

[167]These governance mechanisms are described in Appendix 2.

[168]Robinson & Casalino, *supra* note 60; Linda Dynan, Gloria J. Bazzoli, Lawton Burns, & Robert K. Kuramoto, Assessing the Extent of Integration Achieved through Physician-Hospital Arrangements, 43 J. Healthcare Mgmt. 3 (1998).

[169]For example, hospitals increasingly use specialized "hospitalist" physicians to coordinate emergency room care and inpatient hospital stays. Nearly 90 percent of hospitalists are internal medicine physicians, although only half practice as generalist physicians. Hospitalists reduce patient length-of-stay in the hospital by as much as 10 to 25 percent compared to physicians who do not specialize in hospital inpatient care, and approximately one-quarter of hospitalists are employed by hospitals. See the results of a survey of 372 hospitalist members of the National Association of Inpatient Physicians. See Robert M. Wachter, Winthrop F. Whitcomb, & John R. Nelson, Financial Implications of Implementing a Hospitalist Program, 53 Healthcare Fin. Mgmt. 3 (1999).

(i.e., patient's length of stay in the hospital), and (3) reduce the average cost of care per patient day. The costs of treating a patient are influenced by decisions made both outside and within the hospital: physicians decide to admit a patient to the hospital, and the physician's choice of treatment protocol (e.g., medical or surgical intervention) and patient care decisions during the hospital stay have enormous hospital resource implications. In making patient care decisions physicians are influenced not only by concerns of medical necessity but by the economic incentives they face. These incentives are shaped by the performance incentives and administrative control mechanisms in physician practice organizations (e.g., selective contracting, utilization management and payment mechanisms), which are found in discrete structural combinations[170] in the form of physician practice organizations.

There are four principal discrete forms of physician practices: open-panel PHOs, closed-panel PHOs, IPAs, and group practices. The performance attributes of these physician practice firms were shown in Table 3.2. Integrated firms are better able to respond to coordinated adaptations than network organizations. Integrated physician practice firms make greater investments in the specialized financial and intellectual capital required to achieve stringent cost and quality control. Prior studies have demonstrated that medical group practices exert strong influence on the practice of medicine and are more effective at controlling costs than networks of physicians who practice independently. Group practices use professional leadership and peer pressure to implement the most stringent payment and utilization management mechanisms amongst

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[170]Robinson, *supra* note 65.

physician practice organizations. It is unlikely that loose networks of physician practices (e.g., IPAs, PHOs) can achieve similar efficiencies.[171] Thus, we expect hospital contracting for physician services through group practices to better control hospital operating cost growth than contracting through PHOs or IPAs.

Hypothesis 5.1: Hospitals more effectively control cost growth by contracting for physician services through integrated firms than contractual networks.

3.2. Closed vs. Open Panel Physician Practice

The main distinction between an open and closed-panel PHO is that only a closed-panel PHO uses selective contracting to form its physician network. Selective contracting allows hospitals to limit participation in managed care contracts to those physicians who have the most cost-conscious practice styles compared to their peers. Open-panel PHOs allow any physician who meets basic medical credentialing requirements to join the network, providing a less effective mechanism for cost control. Selective contracting is an *ex ante* mechanism for influencing hospital performance, and it is likely that a combination of *ex ante* selection and *ex post* governance mechanisms will be more effective in controlling hospital cost growth. Yet physicians who exhibit a cost-conscious style of practicing medicine are likely to have developed specialized knowledge that will influence their future practice patterns. Thus, we expect the selective contracting mechanisms of closed-panel PHOs to result in reduced hospital operating cost growth in comparison to inherently non-selective open-panel PHOs *ceteris paribus*.

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[171]Martin Gaynor, in Jaklevic, *supra* note 58.

Hypothesis 5.2: Hospitals more effectively control cost growth by contracting for physician services through closed-panel PHOs than open-panel PHOs.

3.3. Physician Practice Relationship to the Hospital

The financial performance ramifications of the hospital-physician practice relationship were discussed in Chapter 4, Section 3.2. Hospitals procure physician service through either (1) long-term contract or (2) unified ownership. The hospital's cost and quality control capabilities are largely determined by the type of physician practice, but the hospital-physician relationship does not independently contribute to the specialized cost and quality control assets developed by the physician practice. Unified ownership introduces a principal-agent problem into the relationship due to free cash flow and managerial discretion whereby hospital managers do not maximize the value of the physician practice. While Chapter 4 discussed the effects of this principal-agent problem on hospital success in obtaining managed care contracts, there are also important ramifications for hospital operating costs. Hospitals that take ownership of physician practices implement their higher wage and benefit scales[172] and typically convert physicians to flat salary or income guarantee arrangements to overcome physicians' risk aversion.[173] Hospitals (and systems) are less likely to offer physicians incentive-based pay than are physician practices, and when they do it is usually based more on firm than individual performance.[174] The transition to flat salaries is accompanied by

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[172]Robinson, *supra* note 91.

[173]Results of a survey of 392 hospitals by Cejka & Co. in David Burda, Most Hospitals Slow to Join with Group Practices, Mod. Healthcare (Aug. 23, 1993).

[174]Bledsoe, *supra* note 293.

approximately a 25 percent decline in effort.[175] Physicians who shift from FFS to salary lose the incentive to code clinical services for maximum billing rates, resulting in a decline in net practice revenue of approximately 3 to 15 percent.[176] The comparatively higher operating costs of hospital-acquired physician practices persist even after adjusting for wages and other input prices.[177]

Ownership is the organizational form of last resort except in cases where asset specificity and the probability of asset hold-up are high. The vast majority of physician practice assets are not specialized to particular hospital-physician contracting relationships, but unified ownership introduces a principal-agent problem that adversely affects hospital cost control capabilities. Thus, we expect hospital procurement of physician services through unified ownership to result in higher cost growth than procurement through long-term contracts.

Hypothesis 5.3: Hospitals more effectively control cost growth by procuring physician services through long-term contracts than unified ownership of physician practices.

4. Data and Predicted Coefficients

The models in this chapter use the data from the American Hospital Association, Health Care Financing Organization, and state regulatory information as described in Chapter 3 and Appendix 1. The data have binary indicators of most hospital

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[175]Results of a survey of 17 hospitals by Coopers & Lybrand in Anders, *supra* note 85; also see Jan Parr, How to Buy a Medical Practice Without Losing Your Shirt, 71 Hosp. Health Networks 8 (1997).

[176]Zismer & Lund, *supra* note 81.

[177]Robinson, *supra* note 91.

characteristics of interest to this study. For example, the data indicate whether a hospital-physician supplier network contracts with a group practice and whether the relationship is a long-term contract or unified ownership, but they do not provide detailed data on the employment relationship within the physician practice organization (e.g., number of physicians, payment mechanisms). Thus, this study cannot conduct the type of transaction-specific microanalytic hypothesis testing that is characteristic of empirical research in transaction cost economics and principal-agent theory. However, data are available to test hypotheses based on hospital-level composite measures of the physician practice employment relationship (i.e., network versus integrated firm), which is a primary determinant of the ability to control cost growth. Every multivariate regression analysis in this study uses fixed effects panel data estimation techniques to control for unobserved heterogeneity at the level of the firm. Because fixed effects panel data techniques are used, every model investigates how the *change* in the independent variables affects *change* in the dependent variable.

The models of hospital cost containment presented in this chapter use four different dependent variables. The initial models investigate the effects of hospital-physician supplier networks (and other factors) on total hospital operating costs. Other models focus on the effect of supplier networks on volume (i.e., hospital discharges), intensity (i.e., patient length of stay) and average hospital operating costs per patient day. Most models have dichotomous independent variables representing the four principal forms of physician practice organization (i.e., open-panel PHO, closed-panel PHO, IPA, group practice) used in building the hospital-physician supplier network, the relationship of the

physician practice organization to the hospital (i.e., long-term contract or unified ownership), and several other hospital and market characteristics.

Predictions

Hypothesis 5.1 predicts that hospitals more effectively control cost growth by contracting for physician services through integrated firms than contractual networks. Integrated physician practice firms maker greater investments in the specialized assets that yield competitive advantage in cost and quality control than network firms.

Hypothesis 5.2 predicts that hospitals more effectively control cost growth by contracting for physician services through closed-panel PHOs than open-panel PHOs. Closed-panel PHOs selectively contract with physicians based on their practice patterns, while open-panel PHOs do not. Thus, hospitals that contract for physician services through closed-panel PHOs are more likely to have physicians with cost-conscious practice patterns than open-panel PHOs.

Hypothesis 5.3 predicts that hospitals more effectively control cost growth by procuring physician services through long-term contracts than unified ownership of physician practices. Unified hospital-physician ownership of physician practices introduces a principal-agent problem that adversely affects hospital financial performance.

Table 5.1 summarizes the hypothesized signs of coefficients of key variables in models of hospital total cost growth.

Table 5.1: Predicted Coefficients for Hospital Total Cost Growth

Dependent Variable	Predicted Magnitude of Independent Variables[a]	Hypothesis
Total Cost		
	Open-panel PHO > Group practice	5.1
	Closed-panel PHO > Group practice	5.1
	Independent Practice Association > Group practice	5.1
	Open-panel PHO > Closed-panel PHO	5.2
	Unified ownership > Long-term contract	5.3

[a] *Network* physician practice organization models have independent variables Open-panel PHO, Closed-panel PHO, and IPA; *Integrated* models have the independent variable Group practice.

Table 5.1 can be interpreted as follows. The first prediction of Hypothesis 5.1 is that hospitals will be less successful in controlling hospital operating costs when they choose open-panel PHOs instead of physician group practice firms, thus the coefficient for open-panel PHOs will be larger in magnitude than the coefficient for group practices.

The models include independent variables to control for other important firm-level and market characteristics, although no hypotheses are offered for these control variables in an effort to keep the analysis focused on the principal economic phenomena of interest. These control variables include a binary indicator of the presence of state-level any willing provider (AWP) regulation and a variety of hospital attributes: a binary indicator of hospital membership in a multihospital system, the case mix index of average patient severity of illness, and binary indicators of whether the hospital is a for-profit corporation or government entity (omitted category: non-profit corporation).[178]

Descriptive Statistics

Table 5.2 reports means and standard deviations for the variables in the models presented in this chapter. They are based on the panel of 1,904 hospitals operating in

[178]The variables and data sources are described in detail in Appendix 1, Data Sources.

1993 and 1996 that met the study criteria.[179]

Table 5.2: Descriptive Statistics, 1993-96

	1993		1996	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Dependent variable				
Discharges[a]	9,929.9	7,818.8	10,119.7	8,106.3
Length of stay (days)	6.152	3.498	5.338	3.110
Average cost per day ($)	1,360	488	1,688	654
Total operating cost ($000)	89,226	92,697	98,631	104,403
Physician Practice Organization				
Network				
Open-panel PHO (%)	.066	.248	.334	.471
Closed-panel PHO (%)	.191	.393	.190	.392
Independent Practice Assn. (%)	.280	.449	.391	.488
Integrated				
Group practice (%)	.272	.445	.126	.332
Relationship to Hospital				
Long-term contract (%)	.252	.434	.140	.347
Unified ownership (%)	.423	.494	.761	.426
Hospital Characteristics				
System member (%)	.443	.496	.517	.499
For-profit (%)	.138	.345	.154	.36
Government (%)	.156	.363	.142	.350
Market Structure				
Case mix index[b]	1.404	.222	1.423	.222
Any Willing Provider regulation (%)	.174	.379	.301	.459
HHI hospital admissions	3,294	2,864	3,417	2,889
HMO market penetration (%)	.185	.126	.243	.140
Number of HMOs	7.860	6.834	9.881	5.988
Primary care capitated (%)	.449	.249	.485	.235
Specialty care capitated (%)	.182	.209	.217	.203
Factor Prices and Outputs				
Wage index	1.006	.153	1.009	.150
National average hourly wage ($)	13.460	n/a	14.700	n/a
Outpatient visits	112,205	117,360	135,634	140,048
Hospital inpatient days	67,089	59,680	59,713	53,108
N	*1904*		*1904*	

[a]*Discharges are treated as an output in one model.*

[b]*Case mix index is treated as a factor price in one model.*

[179]Sample selection criteria are described in detail in Appendix 1.

5. Empirical Specification and Econometric Methods

Empirical Specification

Economic theory of production expresses a firm's output as a function of capital, labor, and other factor inputs. The dual of the production function is the cost function, where a firm's total costs are a function of factor input prices, output levels, and fixed factors of production. As is commonly done in studies of hospitals using multiproduct cost functions, we assume that hospitals choose inputs to minimize the cost of producing output quantities Q subject to a vector of exogenous factor input prices W and fixed factors[180] of production X:

$$TC = f(W, Q, X) \tag{8}$$

with cost increasing in all of its arguments. In the context of hospital costs, the vector X contains variables that describe market structure, hospital characteristics, and hospital contracting for physician services. The vector X shifts costs from the theoretical minimum determined solely by input prices and output quantities. Hospital characteristics and contracting for physician services influence the marginal product of labor and capital by altering the "production technology" of the hospital. Hospital characteristics and market structure influence the cost of implementing structures for

[180]Fixed factors of production do not vary substantially with output levels, although they may vary over time.

governing production and the costs of market exchange.

In this study, hospital total costs include the operating costs of the hospital facility and its outpatient clinics (e.g., nurses wages, maintenance staff wages, supplies) but exclude capital costs (e.g., major equipment purchases, number of hospital beds), which are fixed in the short run. It is standard practice for physicians to bill for their patient care services separately from the hospital, so physician wages are not included in reported hospital operating costs (except for salaried physicians who have administrative roles in the hospital). Furthermore, the reported hospital operating costs do not include the capital or operating costs of physician practices owned by or affiliated with the hospital, nor do the hospital statistics include patient visits to the physicians' offices.[18]

There are several reasons to suspect that the vector X has endogenous components. Chapter 3 summarized a broad literature on the economic motivation and determinants of hospital contracting for physician services. Hospitals choose forms of contracting for physician services to match hospital characteristics (e.g., patient case mix) and market structure (e.g., HMO penetration). Hospitals choose methods of contracting for physician services to minimize hospital costs and maximize the likelihood of obtaining managed care contracts, and hospitals may choose more stringent forms of physician practice organization in high cost markets (e.g., those with high wage rates). Thus, the choice of contracting forms that we observe may reflect self-selection bias. Furthermore, hospital contracting for physician services changes the hospital production technology, altering output levels for a specified level of inputs. Prior studies have shown that hospital

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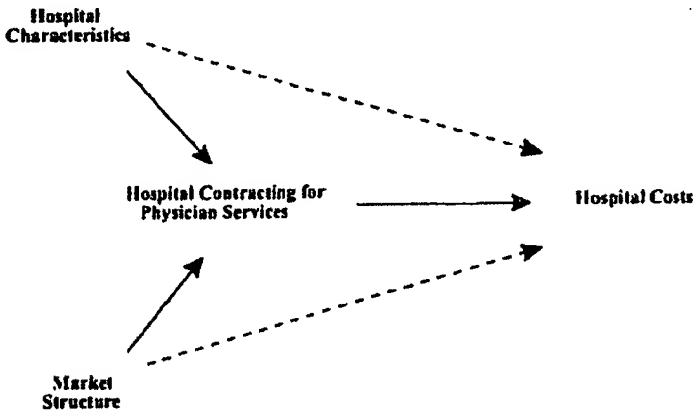
[18]For this reason the study cannot investigate the substitution of outpatient care for hospital inpatient care.

characteristics (e.g., non-profit corporate organization) and market structure (e.g., regulation) directly influence hospital costs.[182] Thus the component of X representing hospital contracting for physician services in equation (8) is endogenous, as illustrated in Figure 1:

Figure 1. Hospital Cost Determinants



Identification of the parameters in equation (8) would require estimation of four additional equations, one for each form of contracting for physician services as a function of exogenous hospital characteristics and market structure variables. While satisfactory instrumental variables were found for two of the contracting forms, available data do not permit the identification of all four forms of contracting. As a result, this study estimates several reduced-form total cost function models of the form:

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[182]Fisher, *supra* note 10; Zwanziger & Melnick, *supra* note 89.

$$TC = f(W, Q, Z) \tag{9}$$

where Z is an exogenous subset of X, and W and Q are as in equation (8).

To provide intuition about the nature of hospital production efficiencies, we derive a simple identity. Hospitals treat patients either in their inpatient hospital facility or during visits to their outpatient clinics. although the vast majority of costs incurred by the hospital are for inpatient care.[183] Total hospital costs (TC) are a product of output quantity (Q_{in}) and average cost (AC_{in}) for inpatients plus the product of output quantity (Q_{out}) and average cost (AC_{out}) for outpatients:

$$TC = (Q_{in} * AC_{in}) + (Q_{out} * AC_{out}) \tag{10}$$

For inpatients, output can be measured by the number of days patients spend in the hospital while average cost is the average cost per patient day. Inpatient output Q_{in} consists of volume (V) and intensity (I) components:

$$TC = ((V * I) * AC_{in}) + (Q_{out} * AC_{out}) \tag{11}$$

For hospital inpatients output "volume" can be measured by the number of patients

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[183]Hospitals may admit an inpatient to one of several different units depending upon the type of services to be delivered (e.g., general acute care, subacute care). However, all aspects of this dissertation (i.e., theory, institutions, hypotheses, data, empirical results) pertain only to general acute care hospital services. The data used in this dissertation include costs for hospital general acute care services, and only those costs for the hospital facility. Costs for other hospital ventures and facilities (e.g., doctors offices and physician practices, ambulatory surgery centers, nursing homes) are not included.

discharged from the hospital (*DIS*), while "intensity" is measured by the average number of days a patient spends in the hospital (*LOS*).[184] For outpatients volume is measured by the number of outpatient visits to hospital clinics (*VIS*), although no comparable measure of intensity is available:

$$TC = (DIS * LOS * AC_{in}) + (VIS * AC_{out}) \quad (12)$$

where *LOS* refers to the "average length of stay" (i.e., the number of patient days divided by discharges).

This dissertation focuses primarily on hospital efforts to reduce inpatient care costs, which account for vast majority of hospital costs and the vast majority of change in hospital costs over the period studied. The cost of outpatient care delivered at the hospital facility is extremely small compared to hospital inpatient costs. Hospital outpatient clinics are primarily used for pre- and post-hospitalization visits to a physician. The vast majority of all patient visits to physicians are to ambulatory care centers that are separate from hospital outpatient clinics (and are not included in the data for this study). To keep the discussion of the empirical specification focused on hospital inpatient costs, equation (12) will be simplified to reflect hospital inpatient costs:[185]

$$TC_{in} = DIS * LOS * AC \quad (13)$$

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[184]By definition, the product of hospital discharges and length of stay equals the number of patient days.

[185]The estimated cost function equations account for both inpatient and outpatient care, although the analysis is focused on inpatient care.

Equation (13) suggests a means of decomposing the effects of hospital cost determinants on total cost into the effects on individual components of total cost. For a particular level of output (i.e., discharges), hospitals minimize inpatient costs by reducing the intensity (i.e., average length of stay) or average cost of treating patients. Cost and quality control mechanisms -- selective contracting with physicians, utilization management, and stringent payment mechanisms -- should lead to shorter average lengths of stay in the hospital. However, change in average cost per day reflects both cost savings due to the use of fewer resources to treat patients (e.g., labor costs, laboratory tests, and supplies) and increased administrative costs of coordinating services (e.g., implementing utilization management and payment mechanisms). Since resource savings and coordination costs are offsetting effects, it is unclear *a priori* whether unit costs will rise or fall. To explore these relationships several reduced-form models of hospital inpatient care are estimated:

$$Q_{in} = f(Z) \tag{14}$$

$$AC_{in} = f(Z) \tag{15}$$

where Q_{in} is an intensity or volume measure, AC_{in} is the average cost per day (i.e., total costs divided by patient days), and Z is an exogenous subset of X as before.

Equation (14) could be used to explore the effects of the variables Z on output quantities that are correlated with gross hospital patient care revenues. Hospitals attempt to obtain more managed care contracts with health plans to gain access to a larger pool of

potential hospital patients, potentially resulting in increased revenues. Most hospital inpatient care is paid for on a per diem basis;[186] under these circumstances, increased hospital output (i.e., patient days) results in increased revenues *ceteris paribus*. However, if hospital care is paid for on a per case basis, then increased output (measured by patient days) will not increase revenues unless it is accompanied by increased patient discharges. The data available for this study do not permit direct measurement of hospital revenues. the number of patient days paid for on a per diem basis versus other methods, or the scale of the hospital-physician supplier network. Thus, no research hypotheses are proposed for changes in hospital revenues.

Econometric Methods

Hospital cost function estimation has received considerable scrutiny.[187] Most studies estimate short-run multiproduct total cost functions using Cobb-Douglas models or flexible functional forms (e.g., translog cost functions) on cross-sectional data. Since the primary variables of interest to this study are the discrete forms of contracting for physician services rather than the structural parameters of the production or cost function, Cobb-Douglas models are used. The nonlinear Cobb-Douglas cost function $C = W^{\alpha} Q^{\gamma}$

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[186]Administrative controls (i.e., utilization management) limits the patient's length of stay in the hospital.

[187]T. G. Cowing, A. G. Holtmann, & S. Powers, Hospital Cost Analysis: A Survey and Analysis of Recent Studies, in 4 Adv. Health Econ. & Health Serv. Rsch., 1983; Thomas W. Granneman, Randall S. Brown, & Mark V. Pauly, Estimating Hospital Costs: A Multiple-Output Analysis, 5 J. Health Econ. 2 (1986); Friedrich Breyer, The Specification of a Hospital Cost Function, 6 J. Health Econ. 2 (1987); Donald F. Vitaliano, On the Estimation of Hospital Cost Functions, 6 J. Health Econ. 4 (1987); Michael G. Vita, Exploring Hospital Production Relationships with Flexible Functional Forms, 9 J. Health Econ. 1 (1990); Paul J. Gertler & Donald M. Waldman, Quality-Adjusted Cost Functions and Policy Evaluation in the Nursing Home Industry, 100 J. Polit. Econ. 6 (1992); Anthony Scott & David Parkin, Investigating Hospital Efficiency in the New NHS: the Role of the Translog Cost Function, 4 Health Econ. (1995); Theodore E. Keeler & John S. Ying, Hospital Costs and Excess Bed Capacity: A Statistical Analysis, 78 Rev. Econ. Stat. 3 (1996).

X^6) corresponding to equation (9) reduces to a simple linear estimating equation through a logarithmic transformation:

$$\ln C_{it} = a_1 \ln W_{it} + a_2 \ln Q_{it} + a_3 \ln Z_{it} + u_i + \varepsilon_{it} \quad (16)$$

where W_{it} is a vector of factor input prices. Q_{it} a vector of hospital output quantities, Z_{it} a vector of exogenous hospital and market structure attributes that shift costs,[188] for T = 2 time periods.

Equations (14) and (15) are also estimated using fixed effects models. The intensity equation (14) is estimated with the natural logarithm of average length of stay as the dependent variable:

$$\ln LOS_{it} = a_1 Z_{it} + u_i + \varepsilon_{it} \quad (17)$$

where Z_{it} is an exogenous set of hospital and market structure attributes.

The average cost equation (15) is estimated using the natural logarithm of total hospital costs[189] divided by patient days as the dependent variable, and the same independent variables as the total cost equation (16):

$$\ln AC_{it} = a_1 \ln W_{it} + a_2 \ln Q_{it} + a_3 \ln Z_{it} + u_i + \varepsilon_{it} \quad (18)$$

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[188]Only continuous variables are subjected to the logarithmic transformation.

[189]In this equation, AC_{it} includes the cost of inpatient and outpatient care, although the average cost of an outpatient visit is less than five percent of an inpatient stay.

Perhaps the greatest challenge in modeling hospital costs is the high degree of unobserved heterogeneity amongst hospitals. Some of the most fundamental determinants of hospital performance (e.g., firm strategy, managerial expertise, quality) are not observable and are likely to be endogenous. Models that do not address these firm-specific effects suffer from biased parameter estimates,[190] a problem that has rarely been addressed in prior cross-sectional studies of hospital costs. This study uses fixed effects panel data estimation techniques to address bias from unobservables, an approach that has only recently been used in hospital cost studies.[191] Fixed effects estimators treat firm-specific effects as a fixed parameter to be estimated, unlike random effects estimators that absorb the effect in the error term and require distributional assumptions about these unobservable firm characteristics. Fixed effects estimators transform the data into deviations about firm-specific means, thereby controlling for differences in unobservable time-invariant firm characteristics. Panel data estimation generates more efficient estimates than cross-sectional models by increasing the number of degrees of freedom and reducing collinearity.[192]

Fixed effects models are most appropriate when individual firm effects are important and correlated to regressors, differences between firms represent parametric shifts in the

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[190]Moulton, *supra* note 111.

[191]Avi Dor & Dean E. Farley, Payment Source and the Cost of Hospital Care: Evidence from a Multiproduct Cost Function with Multiple Payers, 15 J. Health Econ. 1 (1996); Kathleen Carey, A Panel Data Design for Estimation of Hospital Cost Functions, 79 Rev. Econ. Stat. 3 (1997). For a more general treatment, see Peter Schmidt, Estimation of a Fixed-Effect Cobb-Douglas System using Panel Data, 37 J. Econometrics 3 (1988).

[192]Cheng, *supra* note 115.

cost function, and the sample is nearly exhaustive of the population of relevant firms;[193] all three conditions are met by this study. Fixed effects models place no restrictions on the distribution of individual firm effects, and they reduce the inconsistency of omitted variables that is common in random effects models.[194] While results of fixed effects estimations cannot be generalized out of sample, this study's sample contains nearly all short-term general acute care hospitals in metropolitan areas of the United States. A significant disadvantage of fixed effects estimation is the large number of parameters that must be estimated to capture firm-specific effects. The substantial number of degrees of freedom required for firm-level intercepts places practical limits on the number of explanatory variables in the model, and makes the additional demands of translog cost function estimation (over Cobb-Douglas models) infeasible for this study.

The second major challenge in modeling hospital costs is endogeneity amongst observable determinants of hospital costs. Figure 1 illustrates the potential difficulties in including both market structure and hospital contracting for physician services as regressors to explain hospital costs. Furthermore, economic theory of production and costs assume that output levels are exogenously determined by market demand. However, hospital characteristics and contracting for physician services alters the production technology of the hospital, making output levels endogenous. Data are not available to estimate structural equations that include all the variables of interest to this study. Thus I investigated the potential endogeneity amongst observable determinants of

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[193]Greene, *supra* note 107.

[194]Gary Chamberlain, Omitted Variable Bias in Panel Data: Estimating the Returns to Schooling, 30/31 Annales de L'Insee (1978); Jerry A. Hausman & William E. Taylor, Panel Data and Unobservable Individual Effects, 49 Econometrica (1981).

costs by comparing the estimated coefficients (i.e., signs, magnitudes, and significance) of variables in a number of variants of the reduced-form models. First, individual explanatory variables within each class of cost determinants (hospital characteristics, contracting for physician services, market structure, factor prices and outputs) were added to the model. Then various classes of explanatory variables were used in combination. After analysis of the results, the final specification of the model was determined.

6. Empirical Results

6.1. Total Cost Growth

The results of fixed effects estimation of the reduced-form of equation (16), the effects of hospital contracting for physician services on hospital total cost,[195] are shown in Table 5.3a and 5.3b. Theory suggests that unobservable individual hospital attributes are likely to be correlated with the observable determinants of hospital costs. A Hausman specification test[196] of this presumption for Model 1 has a test statistic of $\chi^2(11) = 1598.86$, with the null hypothesis strongly rejected at the .00001 percent level of significance.[197] The individual firm fixed effects are significant in this model and in every other specification of the model that was investigated, suggesting that fixed effects models should be used instead of random effects models. As discussed in the models of

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[195]The data used in this dissertation include costs for hospital general acute care services, and only those costs for the hospital facility. This includes general acute inpatient care (but not subacute care), and services delivered in hospital outpatient clinics at the hospital facility. Costs for other hospital ventures and facilities (e.g., doctors offices and physician practices, ambulatory surgery centers, nursing homes) are not included.

[196]Hausman, *supra* note 121.

[197]The Hausman test statistic for Model 2 was 863.81, with the null hypothesis strongly rejected at the .00001 level of significance.

choice of physician practice organization, there is strong evidence of selection bias based on market labor costs (i.e., hospitals are more likely to contract for physician services in high-wage markets) but no evidence of endogeneity of case mix (i.e., hospital contracting does not influence patient case mix). Since inclusion of wage rates would cause biased parameter estimates, they were not included in the models of hospital costs and revenues. Instead, reduced-form models were estimated.

Two versions of the model were estimated. Model 1 excludes all market structure variables (e.g., HHI hospital admissions) except the case mix index and regulatory variables, while Model 2 includes them. The signs and standard errors were stable for most coefficients after the market structure variables were added with the exception of the long-term contract variable, which changed signs but in both cases is nearly zero. The relative magnitudes of the variables for physician practice organization (i.e., network versus integrated) and relationship to the hospital (i.e., long-term contract versus unified ownership) were smaller will the full set of market structure variables. There is no evidence of endogeneity of the market structure and physician practice organization variables in Model 2. However, the addition of the five market structure variables to the models estimated later in this chapter reduced the significance of some of the variables of interest (closed-panel PHO and unified ownership).[198]

[198]In many of the models adding several additional variables did not change coefficient magnitudes substantially, but some coefficients were no longer statistically significant. This is not surprising since the fixed effects estimator requires a substantial number of degrees of freedom for individual intercepts.

Table 5.3a: Effect of Hospital Contracting for Physician Services on Hospital Total Cost, 1993-96

Variable	Model 1 Total Cost (ln)	Model 2 Total Cost (ln)
Physician Practice Organization		
Network		
Open-panel PHO	.048 ***	.034 ***
	(.009)	(.009)
Closed-panel PHO	.017 *	.012
	(.009)	(.009)
Independent Practice Assn.	.015	.009
	(.009)	(.009)
Integrated		
Group practice	-.043 ***	-.027 ***
	(.009)	(.009)
Relationship to Hospital		
Long-term contract	-.002	.003
	(.009)	(.009)
Unified ownership	.044 ***	.028 ***
	(.009)	(.009)
Hospital Characteristics		
System member	.011	-.004
	(.014)	(.013)
For-profit	-.052 **	-.048 *
	(.026)	(.025)
Government	-.073 **	-.058 **
	(.029)	(.029)
Market Structure		
Case mix index	.117 *	.049
	(.061)	(.060)
Any Willing Provider regulation	.065 ***	.041 ***
	(.013)	(.013)
HHI hospital admissions	*n/a*	.169e-4 **
		(.693e-5)
HMO market penetration (%)	*n/a*	.244 ***
		(.051)
Number of HMOs	*n/a*	.007 ***
		(.002)
Primary care capitated (%)	*n/a*	.071 ***
		(.017)
Specialty care capitated (%)	*n/a*	.027
		(.022)
Intercept	17.720 ***	17.625 ***
	(.087)	(.087)

Table 5.3b: Effect of Hospital Contracting for Physician Services on Hospital Total Cost, 1993-96

Variable	Model 1 Total Cost (ln)	Model 2 Total Cost (ln)
N	*3808*	*3808*
R^2 within	*.112*	*.156*
R^2 between	*.194*	*.012*
R^2 overall	*.156*	*.013*
Prob > F	*.000*	*.000*
Corr(u, Xβ)	*.336*	*.030*

[a] Standard error in parentheses. Significance levels are 1% (***), 5% (**), and 10% (*). Corrections to dummy variable coefficients for their estimated variance in semilogarithmic equations (Kennedy, 1981) were negligible.

Table 5.3a and 5.3b display the results for the two estimations of hospital total cost models, Model 1 and Model 2. The relationship between the parameters of interest to this study (e.g., network versus integrated physician practice organization) are similar in the models, although the absolute magnitude of coefficients was lower when the additional market structure variables were included (Model 2). Thus, there are differences in hospital cost growth due to the form of physician practice organization even when controlling for market conditions. This analysis will focus on the results of Model 2, which has more conservative estimates of the relative magnitudes of the coefficients.

Principal Results

In all cases except group practice, the hospital's choice of physician practice organization increased total cost growth compared to spot-market procurement of physician services. The effects on total cost growth ranged from approximately 1 percent to 3.4 percent in absolute value.

Hypothesis 5.1 predicts that hospitals more effectively control cost growth by contracting for physician services through integrated firms than contractual networks. Integrated firms make greater investments in the specialized assets that yield competitive advantage in cost and quality control. The coefficients for the network variables (i.e., open-panel PHO, closed-panel PHO and IPA) were all larger than the coefficient for the integrated firms variable (i.e., group practice) as predicted. While only the open-panel PHO and group practice coefficients were individually statistically significant, the differences between the physician practice organization coefficients were highly

significant.[199] Total costs are 6.1 percent higher for hospitals that choose open-panel PHOs instead of group practices. Group practice firms are able to implement more stringent utilization management and payment mechanisms than loose networks of physicians in PHOs and IPAs.[200]

Hypothesis 5.2 predicts that hospitals more effectively control cost growth by contracting for physician services through closed-panel PHOs than open-panel PHOs. Both models support this prediction. While the closed-panel PHO coefficient is not individually statistically significant in Model 2, the difference between it and the open-panel coefficient is significant in both models.[201] Closed-panel PHOs use selective contracting to limit physician panels to the most cost-effective physicians, resulting in one-third the cost growth of unselective open-panel PHOs.

Hypothesis 5.3 predicts that hospitals more effectively control cost growth by procuring physician services through long-term contracts than unified ownership of physician practices. The near-zero coefficient on long-term contracting is not significant, but the unified ownership coefficient shows a 2.8 percent growth in costs that is strongly

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[199]A test of the null hypothesis that the four physician practice organization coefficients in Model 2 were equal was strongly rejected, with $F(3, 1888) = 8.72$, $Prob > F = 0.000$. For Model 1, $F(3, 1893) = 19.97$, $Prob > F = 0.000$.

[200]While group practices achieve greater operating cost reductions, they require greater capital investments than PHOs and IPAs. Chapter 3 contends that hospitals need not make the substantial investments in group practices to secure affiliations with cost-effective physicians in less competitive markets. Thus, the apparent paradox of greater operating cost reductions but decreased contracting with group practices may be explained by several factors: not all hospitals find the substantial capital investments required for group practices to offset their operating cost gains, and not all markets (nor managed care contracts) require the most stringent cost and quality controls embodied in physician group practices.

[201]A test of the null hypothesis that the open and closed-panel PHO coefficients in Model 2 were equal was strongly rejected, with $F(1, 1888) = 5.59$, $Prob > F = 0.0181$. For Model 1, $F(1, 1893) = 10.38$, $Prob > F = 0.0013$.

significant; the differences in coefficients are highly significant.[202] With few specialized assets at stake in the choice of relationship to the hospital, hospital-physician practice unified ownership proved more costly than long-term contracts for procurement of physician services.

It is conceivable that some forms of hospital contracting for physician services are more efficiently performed through unified ownership than long-term contracts, or that unified ownership adds coordination costs that are largely independent of the form of contracting for physician services. An alternative specification of the model was used to explore this question by adding interactions between the four forms of contracting for physician services and the long-term contract versus unified ownership variables. While the magnitudes of the original physician contracting variables were relatively similar, most of them were no longer significant and none of the interaction terms was significant. Thus, the results of this test were inconclusive. The substantial number of degrees of freedom required for fixed effects estimation makes addition of many additional variables to the model impractical.

Control Variable and Other Results

The signs of remaining coefficients in Table 5.3 were consistent with expectations based on results of prior research. Any Willing Provider regulation restricts the use of selective contracting in forming physician panels, raising hospital cost growth by 4.9 percent. For-profit hospitals had 4.8 percent lower cost growth than private non-profit

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[202]A test of the null hypothesis that the long-term contract and unified ownership coefficients in Model 1 were equal was strongly rejected, with F(1, 1888) = 6.04, Prob > F = 0.0141. For Model 1, F(1, 1893) = 18.90, Prob > F = 0.0000.

hospitals (the omitted category). Hospitals that treated a more severely ill mix of patients had higher cost growth, although this finding was not statistically significant in the model that controlled for a broad range of market structure factors. Hospital system membership has exhibited conflicting effects on costs in prior studies;[203] it had no significant effect on hospital cost growth in these models.

Alternative Specification

Two alternative specifications of equation (16) were used to investigate the endogeneity between hospital contracting for physician services and both market structure (especially physician capitation) and hospital outputs (discharges, inpatient days, and case mix). In Table 5.3a and 5.3b, Model 2 shows the results of adding market structure variables to the estimation of Model 1. While the coefficients of the physician practice organization, relationship to the hospital and regulation variables were lower in Model 2, their relative magnitudes were similar to those of Model 1. The market structure variables not only influence costs through hospital contracting for physician services, but they also have a direct effect on hospital costs. Most prior studies of hospital costs have avoided potential endogeneity by including measures of market structure but omitting the characteristics of hospital production technology (i.e., forms of contracting for physician services). Table 5.4 shows the results of an alternative fixed effects specification of equation (16) that is more comparable to prior studies of hospital costs. Variations on this specification that excluded hospital characteristics or market structure variables had little effect on the coefficients of factor prices and outputs. However, all specifications of

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[203]Snail & Robinson, *supra* note 18.

the model that included factor prices and outputs exhibited high correlation (at least .8) between the individual firm component of the error term (u_i) and the estimated parameters ($X\beta$), indicating that factor prices and outputs are endogenous. The reduced-form models estimated for Table 5.3 exhibit a negligible correlation between u_i and $X\beta$ (.336 and .030).

Table 5.4: Effects of Market Structure, Factor Prices, and Output on Hospital Total Cost, 1993-96

Variable	Total Cost (ln) Estimate[a]		Standard Error
Hospital Characteristics			
System member	-.011		.011
For-profit	-.025		.020
Government	-.072	***	.023
Market Structure			
HHI of hospital admissions	.195e-4	***	.559e-5
HMO market penetration (%)	.049		.043
Number of HMOs	.002	*	.001
Primary care capitated (%)	.034	**	.014
Specialty care capitated (%)	.017		.018
Factor Prices and Outputs			
Wages (ln)	.827	***	.048
Case mix index	.098	**	.049
Hospital discharges (ln)	.373	***	.022
Outpatient visits (ln)	.020	***	.003
Hospital inpatient days (ln)	.110	***	.018
Intercept	10.792	***	.231
N	*3808*		
R^2 *within*	*.450*		
R^2 *between*	*.897*		
R^2 *overall*	*.888*		
Prob > F	*.000*		
Corr(u, Xβ)	*.807*		

The coefficients generally exhibit the expected signs. Hospitals had higher cost growth in more concentrated markets, where hospital competition was lowest. The coefficients of market-level measures of health plan competition and the stringency of

cost and quality control all had positive signs. Increased competition amongst health plans lowers the concentration of purchasing leverage, reducing the pressure on hospitals to contain costs. Capitated payment of primary care physicians should reduce hospital cost growth if primary care physicians share substantial financial risk for hospitalization; the unexpected positive sign on this coefficient implies that primary care physicians still share minimal or no financial risk for hospital care in most markets. Alternatively, the positive signs on market structure variables are consistent with the conventional wisdom that stringent cost control is most likely to be implemented in high cost markets, indicating selection bias. Costs were positively related to all factor prices and outputs. The largest component of hospital costs are labor costs, and total costs are very responsive to changes in wage rates. A ten percent increase in wage rates increases hospital costs by over eight percent. The elasticity of total cost with respect to hospital discharges was three times the elasticity with respect to inpatient days and over eighteen times the elasticity with respect to outpatient visits. These results are consistent with the relative marginal costs of a discharge, inpatient day and outpatient visit in prior studies.[204]

6.2. Components of Total Cost: Volume, Intensity and Average Cost

All forms of hospital contracting for physician services except group practice result in higher total hospital costs compared to spot market procurement of physician services, and unified ownership of physician practices is more costly than procurement of physician services through long-term contracts. Hospitals expend resources to implement cost and quality controls in the hope of recouping those investments through lower costs

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[204]See Kathleen Carey, Stochastic Demand for Hospitals and Optimizing Excess Bed Capacity, 14 J. Reg. Econ. 2 (1998), and citations therein.

of patient care. While numerous studies have investigated the growth of hospital costs and a few have looked at the components of total costs (e.g., intensity and average cost), none has examined the effects of hospital contracting for physician services on the components of hospital costs. This section explains how changes in the offsetting components of costs resulted in higher total hospital cost growth.

Hospital costs can be decomposed into the two principal components in equation (13), inpatient output quantity and average cost.[205] For a particular level of output (i.e., discharges), hospitals attempt to minimize costs by reducing the intensity of service (i.e., patient length of stay in the hospital) or the average cost of treating patients. Three different fixed effects models were estimated for the components of hospital total cost: discharges, length of stay (i.e., intensity), and average cost (per patient day). Table 5.5 compares these results to the previous estimation of hospital total costs. For a particular variable, the sum of the coefficients for the three cost component models is approximately equal to the coefficient for the total cost model.[206] Displaying the results in this manner accentuates the offsetting effects of various components on total cost. For example, the higher levels of discharges in IPAs is offset by lower average length of patient stay (2.3 and -2.0 percent, respectively), so the change in total cost is nearly equal to the change in average cost (.2 versus .9 percent). The decreased length of stay due to unified ownership is largely offset by higher average cost per day (-4.7 and 5.0 percent, respectively), so the change in total costs is primarily driven by increased patient

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[205]In virtually all cases, hospital contracting for physician services was not a statistically significant predictor of the components of equation (12) that are excluded from equation (13) – discharges [inpatient volume], visits [outpatient volume], and outpatient average cost.

[206]The sum would be even closer if the coefficient for the outpatient visit model were included. However, this analysis is focused on components of hospital inpatient costs.

discharges.

Table 5.5a: Effect of Hospital Contracting for Phys. Services on Cost Components, 1993-96[a]

Variable	Components of Total Cost: Discharges (ln)	Length of Stay (ln)	Average cost (ln)	Total Cost (ln)
Physician Practice Organization				
Network				
Open-panel PHO	-.010	-.053 ***	.089 ***	.034 ***
	(.010)	(.010)	(.012)	(.009)
Closed-panel PHO	-.001	-.010	.018	.012
	(.010)	(.010)	(.013)	(.009)
Independent Practice Assn.	.023 **	-.020 *	.002	.009
	(.010)	(.010)	(.012)	(.009)
Integrated				
Group practice	.007	.034 ***	-.073 ***	-.027 ***
	(.010)	(.010)	(.012)	(.009)
Relationship to Hospital				
Long-term contract	.006	.012	-.001	.003
	(.010)	(.011)	(.012)	(.009)
Unified ownership	.014	-.047 ***	.050 ***	.028 ***
	(.009)	(.010)	(.012)	(.009)
Hospital Characteristics				
System member	-.003	-.036 **	.029	-.004
	(.014)	(.016)	(.018)	(.013)
For-profit	-.066 **	-.028	.042	-.048 *
	(.027)	(.029)	(.035)	(.025)
Government	.018	.014	-.107 ***	-.058 **
	(.031)	(.033)	(.040)	(.029)
Market Structure				
Case mix index	-.239 ***	-.133 *	.399 ***	.049
	(.065)	(.070)	(.083)	(.060)
Any Willing Provider regulation	.020	-.015	.041 **	.041 ***
	(.014)	(.015)	(.018)	(.013)
HHI hospital admissions	-.178e-4 **	-.12e-4	.455e-4 ***	.169e-4 **
	(.744e-5)	(.803e-5)	(.95e-5)	(.69e-5)
HMO market penetration (%)	.065	-.557 ***	.686 ***	.244 ***
	(.054)	(.059)	(.070)	(.051)
Number of HMOs	.002	-.007 ***	.008 ***	.007 ***
	(.002)	(.002)	(.002)	(.002)
Primary care capitated (%)	.025	-.019	.057 **	.071 ***
	(.019)	(.020)	(.024)	(.017)
Specialty care capitated (%)	-.017	-.060 **	.120 ***	.027
	(.024)	(.026)	(.031)	(.022)
Intercept	9.23 ***	2.183 ***	6.214 ***	17.625 ***
	(.093)	(.100)	(.118)	(.087)

Table 5.5b: Effect of Hospital Contracting for Phys. Services on Cost Components, 1993-96[a]

Variable	Components of Total Cost: Discharges (ln)	Length of Stay (ln)	Average cost (ln)	Total Cost (ln)
N	*3808*	*3808*	*3803*	*3808*
R^2 within	*.029*	*.231*	*.309*	*.156*
R^2 between	*.010*	*.001*	*.031*	*.012*
R^2 overall	*.009*	*.015*	*.060*	*.013*
Prob > F	*.000*	*.000*	*.000*	*.000*
Corr(u_i, Xβ)	*-.179*	*-.276*	*-.225*	*.030*

[a] Standard error in parentheses. Significance levels are 1% (***), 5% (**), and 10% (*). Corrections to dummy variable coefficients for their estimated variance in semilogarithmic equations (Kennedy, 1981) were negligible.

Volume (Discharges) Findings

The column in Table 5.5 labeled "Discharges (ln)" presents the results of fixed effects estimation of the reduced-form equation (17). The Hausman specification test for the significance of individual firm effects was highly significant for this model,[207] indicating that a fixed effects specification is appropriate instead of a random effects specification.

Of the hospital choices of physician practice organization, only independent practice associations (IPAs) had a statistically significant effect on the number of hospital discharges, increasing them by 2.3 percent. The variables describing the physician practice relationship to the hospital were also not significant. Increased discharges reflects either expansion of the hospital-physician supplier network to cover a larger pool of potential patients or a higher rate of hospitalization of the existing pool of patients. Since the data available for this study do not allow controls for the scale of the supplier network, the number of potential patients covered by the network, or the mix of payment

[207] For the length of stay results in Table 5.5, the Hausman specification test strongly rejects the random effects specification with $\chi^2(16) = 1343.56$, Prob > $\chi^2 = 0.0000$.

methods (some which make increased discharges more profitable, others not), no other conclusions can be drawn from the discharge findings.

Intensity (LOS) Findings

The column in Table 5.5 labeled "Length of Stay (ln)" presents the results of fixed effects estimation of the reduced-form equation (17). The Hausman specification test for the significance of individual firm effects was highly significant for this model,[208] indicating that a fixed effects specification is appropriate.

Average patient length of stay (LOS) is a widely used indicator of hospital efficiency under managed care. Total health care costs can be reduced by discharging patients from the hospital after the most intensive medical care is delivered early in the patient's stay, with follow-up and custodial care delivered in less costly outpatient or home settings. Hospitals with longer average LOS are considered relatively inefficient in the use of resources compared to those with shorter LOS.

Table 5.5 shows that all forms of hospital contracting for physician services except group practice decreased average length of stay in the hospital; the effects were statistically significant for all but closed-panel PHOs. The reductions in length of stay ranged from 1.0 to 5.3 percent, and the differences in the coefficients are statistically significant.[209] Hospital unified ownership of physician practices was associated with a 4.7 percent reduction in length of stay, but procurement through long-term contracts increased length of stay by 1.2 percent. While only the unified ownership coefficient is

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[208]For the length of stay results in Table 5.5, the Hausman specification test strongly rejects the random effects specification with $\chi^2(16) = 143.29$, Prob > $\chi^2 = 0.0000$.

[209]A test of the null hypothesis that the four physician practice organization coefficients were equal was strongly rejected, with $F(3, 1888) = 14.74$, Prob > $F = 0.0000$.

individually statistically significant, the difference between it and the long-term contract coefficient is significant.[210] The results are consistent with the presumption that ownership is favored when quality and level of effort are important but effective arms-length monitoring is difficult to achieve,[211] and that unified ownership reduces the free-rider problems in physician-hospital relationships.[212]

The positive association between procurement through group practice and length of stay was unexpected. Group practices typically implement the most stringent cost and quality controls of all forms of physician practice organization, thus we would expect them to be the most effective in controlling length of stay. Table 4.6 showed that hospitals using group practices are more likely to obtain capitated than non-capitated HMO contracts. HMOs prefer capitated payment terms when contracts involve a more complex mix of cases since capitation creates stronger incentives to control costs. Thus, the positive sign on average length of stay for group practice may reflect selection bias in the awarding of managed care contracts: group practices get a more complex mix of cases that require longer stays in the hospital *ceteris paribus* since they are better able to control cost and quality. While this study controls for overall hospital case mix, no data are available to control for severity of illness of patients cared for under individual forms of hospital contracting for physician services.

Change in LOS due to financial incentives may reflect improved or diminished

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[210]A test of the null hypothesis that the long-term contract and unified ownership coefficients were equal was strongly rejected, with $F(1, 1888) = 23.42$, $Prob > F = 0.0000$.

[211]Robinson, *supra* note 91.

[212]John D. Simpson & Malcolm B. Coate, Efficiencies or Anticompetitive Effects: Vertical Integration of Hospitals into Medical Practices, 43 The Antitrust Bulletin 2 (1998).

quality of care. Adopting more efficacious treatment regimens or reducing unnecessary delays during a hospital stay allows a patient to be discharged more quickly, speeding their return home and decreasing their exposure to iatrogenic illness in the hospital. If hospitals attempt to lower costs by prematurely discharging patients, significantly reduced LOS may reflect diminished quality care. However, poor quality of care may cause subsequent complications that extend length of stay or result in readmission to the hospital at a later time.[213] In general, it is reasonable to associate shorter length of stay with similar or higher quality of care provided that readmissions to the hospital do not rise. The data available to this study do not distinguish between a patient's first and subsequent admissions to the hospital for the same illness. However, the "Discharges" column of Table 5.5 shows that hospital contracting for physician services does not significantly affect the overall number of patients served by hospitals. Thus, the observed reductions in length of stay from hospital contracting for physician services are not likely to reflect diminished quality of care.

Average Cost Findings

Table 5.5 shows that hospital contracting for physician services increased the average cost per day of hospital care in all cases except group practice. While these results were individually statistically significant for open-panel PHO and group practice, the differences amongst the network forms and the differences between the network and integrated firms were both statistically significant.[214] The increases in average costs

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[213] J. W. Thomas, K. E. Quire, & G. G. Horvat, Is Patient Length of Stay Related to Quality of Care?, 42 Hosp. Health Serv. Admin. 4 (1997).

[214] A test of the null hypothesis that the three network form coefficients were equal was strongly rejected, with F(3, 1888) = 33.86, Prob > F = 0.0000. A test of the null hypothesis that the open and

ranged from .2 to 8.9 percent, while group practice reduced average cost by 7.3 percent. Since average cost reflects both savings per day in resource utilization and increased coordination costs of implementing utilization management and payment mechanisms, no prediction could be made *a priori* as to whether average cost would rise or fall. No prior study has attempted to isolate the coordination costs (or average costs) associated with hospital contracting for physician services.

7. DISCUSSION

Although there is a substantial literature on the effects of hospital characteristics and market structure on hospital costs,[215] no prior empirical study has used multivariate regression analysis to test the effects of specific forms of hospital contracting for physician services on hospital costs, revenues, or other measures of financial performance. Most regression analyses of hospital-physician relationships have focused on the effects of general strategies for physician participation in hospital governance (e.g., committee membership) and utilization management on hospital financial performance, and most studies examine periods before the widespread expansion of managed care.[216] This study found that the form of hospital contracting for physician services had a substantial effect on hospital cost growth even after controlling for market conditions. Hospital contracting with integrated physician practice firms reduced hospital total cost

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closed-panel PHO and group practice coefficients were equal was strongly rejected, with F(2, 1888) = 50.79, Prob > F = 0.0000.

[215]For a review of the literature, see Jack Hadley & Stephen Zuckerman, Determinants of Hospital Costs: Outputs, Inputs, and Regulation in the 1980s, 1991.

[216]Snail & Robinson, *supra* note 18.

growth, while contracting with network firms increased cost growth. Integrated physician practice firms make greater investments in the specialized financial and intellectual capital assets that yield competitive advantage in cost and quality control than network firms. The physician practice's relationship to the hospital also influenced total cost growth, with unified ownership raising cost growth compared to long-term contracts.

The results of this study are generally consistent with those of prior studies of hospital financial performance. Case studies have shown that hospitals with higher levels of physician participation in governance and coordination of clinical activities are associated with lower staffing per hospital patient and higher net revenue.[217] Under managed care, hospitals that share moderate levels of governance and financial risk with physicians had higher operating margins than those who shared high or low levels.[218] Arrangements that balanced governance and financial rewards of hospitals and physicians more closely aligned hospital and physician performance incentives and improved profitability.

This is the first empirical study to investigate the effects of hospital contracting for physician services on the components of hospital total costs: volume (i.e., discharges), intensity (i.e., patient length of stay), and average cost per patient day. Integrated physician practice firms increased intensity of service but greatly reduced average cost per day, resulting in an overall reduction in hospital costs. Network firms had the opposite effect: they lowered intensity of service, but raised average cost per day and total hospital costs. These results are consistent with the conventional wisdom that it is easier

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[217]Stephen M. Shortell, Robin R. Gillies, & David A. Anderson, The New World of Managed Care: Creating Organized Delivery Systems, 13 Health Aff. 5 (1994).

[218]Goes & Zhan, *supra* note 165.

to reduce hospital length of stay (i.e., discharge patients from the hospital sooner) than to make the substantial changes in physician practice patterns necessary to reduce hospital resource consumption. Integrated physician practice firms use professional leadership and peer pressure to implement more stringent cost controls than are typically found in network firms. It is unclear why integrated physician practice firms were associated with increased length of stay, although it may indicate selection bias in the awarding of managed care contracts. Health plans may be more likely to award integrated firms the contracts covering a more complex mix of patients because they are better able to control costs than network firms.

While the findings of this study generally support the hypotheses based on transaction cost economics and principal-agent theory, it should be noted that this study could not conduct the type of transaction-specific microanalytic hypothesis testing that is characteristic of empirical research in these areas. Detailed data on individual hospital-physician contracts and the employment relationship within the physician practice are not publicly available. Instead, hospital-level aggregate measures of the physician practice employment relationship (i.e., network versus integrated firm) were used. For this reason it was not possible to evaluate specific incentive and control mechanisms within the firm (e.g., payment mechanisms). Future empirical studies of these individual mechanisms could help explain the observed differences amongst the discrete structural forms of organization.

This study focused the effects of hospital contracting for physician services on hospital inpatient operating costs; it did not investigate the effects on hospital capital costs, revenues, or net profitability. It was also not possible to investigate the effects of

hospital contracting for physician services on the entire health care delivery system, including the hospital inpatient facility and physician practices. Studies of hospital revenues could help determine whether the observed effects of hospital contracting for physician services on cost growth are reinforced or offset by changes in hospital revenues. Studies of the combined hospital and physician practice organization (if not the entire local delivery system) could investigate whether or not reduced hospital costs are offset by increased physician practice costs.

CHAPTER 6: CONCLUSION

1. CONTRACTING FOR PHYSICIAN SERVICES AND HOSPITAL PRODUCTION

Most empirical research on hospital financial performance has focused on two research questions: choosing the appropriate specification of the hospital cost function and estimating the structural parameters of the cost function.[219] Hospitals are multiproduct firms with nonstandardized factor inputs (e.g., health status of patients) used to produce a variety of outputs. While the research has increased our understanding of the effects of factor input prices and regulation on hospital performance, it has been nearly silent on how particular forms of hospital contracting for physician services affect hospital performance. This dissertation began to address this research deficit by examining the main discrete structural alternatives for physician practice organization (i.e., open and closed-panel physician-hospital organizations, independent practice organizations, and medical group practices) and the implications of the hospital's choice of physician practice organization for hospital performance. Transaction cost economic theory was used to develop a framework for comparing these organizational alternatives and predicting their performance implications. Principal-agent theory was used to explain the effects of hospital managerial discretion over physician practices on hospital performance.

Hospital-physician contractual relationships have a profound influence on the transformation of factor inputs into hospital outputs. Physicians are rarely employees of

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[219]See the studies cited in notes 187 and 191.

the hospital, but their medical practice patterns determine the vast majority of hospital resource allocation decisions. The physician's incentives to practice medicine in a cost-conscious manner are strongly influenced by the form of physician practice organization (e.g., an integrated firm versus a network of independent contractors). This dissertation found that the hospital's choice of physician practice organization and its relationship to the hospital influence the hospital's success in obtaining managed care contracts and the hospital's ability to control costs.

2. Coordination Costs vs. Efficiency Gains

The two central themes of this dissertation are (1) the comparison of organizational alternatives for hospital contracting for physician services and (2) evaluation of financial performance implications arising from the varying capacities of different forms of organization to adapt to changing market conditions. Chapters 3 through 5 empirically investigated the effects of hospital contracting for physician services on several measures of hospital financial performance, including the ability to obtain managed care contracts, reduce patient length of stay, and reduce hospital cost growth. But attainment of these efficiencies is not costless; every organizational alternative entails trade-offs amongst incentive and control mechanisms that may individually raise or lower financial performance.[220] This chapter abstracts this fundamental dynamic from the empirical investigations of earlier chapters: the trade-off in economic coordination costs and efficiency gains that hospitals face under alternative forms of contracting for physician

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[220]Williamson, *supra* note 38.

services. No prior empirical study has explored this trade-off in the context of hospital contracting for physician services.

Hospitals make two fundamental choices in contracting for physician services: the form of physician practice organization (e.g., network or integrated firm) and the type of contractual relationship between the hospital and physician practice (e.g., long-term contract or unified ownership). Each organizational alternative is associated with a set of economic coordination costs and potential efficiency gains, which have offsetting effects on hospital financial performance. Coordination costs are the comparative costs of implementing one organizational alternative versus another. For example, integrated firms have higher bureaucratic costs and attenuated performance incentives compared to market contracts.[221] For hospital services coordination costs reflect the resources needed to implement cost and quality control mechanisms. Hospitals hope to recoup these coordination costs through efficiency gains in production or contracting.

This study finds that hospital contracting for physician services generally increases hospital total operating costs in the short-run except in the case of group practice, the most stringent form of physician practice organization. Hospital total costs consist primarily of the product of three components: volume (i.e., discharges), intensity (i.e., length of stay) and average cost.[222] Volume and intensity measure resource utilization. Average costs reflect coordination costs of implementing cost and quality control mechanisms less savings in resource utilization per patient day. The savings in volume and intensity for network forms of physician practice organization are outweighed by

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[221]Williamson, *supra* note 38.

[222]See Chapter 5, Section 5.

increased average costs, while the reverse is true for group practice. Thus, efficiency gains are outweighed by coordination costs in all cases except hospital contracting with group practices.

This finding is what we would expect for the time period under study. From 1993 to 1996, hospitals faced strong and growing market-level demand for cost and quality control.[223] Improvements in cost and quality control require investments in specialized financial and intellectual capital and better coordination between the hospital and physician practice.[224] Integrated firms (e.g., group practices) are better able to adapt to disturbances that require coordinated responses than are network firms (e.g., PHOs and IPAs) *ceteris paribus*. Hospitals seek to improve their financial performance by choosing the form of contracting for physician services which best matches the market demand for stringent cost and quality control given capital availability, and regulatory and other constraints.[225]

3. Antitrust Policy Implications

This study has important implications for parties to antitrust litigation, whose recent cases and settlements have examined both vertical and horizontal effects of hospital contracting for physician services. While this study does not evaluate the effect of hospital contracting for physician services on the competitive structure of specific

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[223]See Chapter 2, Table 2.2.

[224]See Chapter 2.

[225]This echos a key insight of transaction cost economics: there is a discriminating alignment between the firm's choice of organizational alternatives and the attributes of transactions, and the merits of these choice varies under different market conditions. See Williamson, *supra* note 1.

hospital markets, it does examine the effects on hospital efficiency (e.g., ability to reduce patient length of stay or control hospital costs). Efficiency arguments have gained prominence in antitrust actions due to recent changes in federal antitrust regulation, which now recognizes potential efficiency-enhancing motivations of physician network formation.[226] Antitrust evaluation of hospital entry into the physician services market may now involve weighing efficiencies versus anticompetitive effects of the action.[227]

Hospital contracting for physician services may raise antitrust concerns for two reasons. First, in antitrust regulation hospital contracting for physician services is viewed as vertical integration into physician practices. Vertical integration has the potential to reduce transaction costs between buyer and seller,[228] although it may raise antitrust concerns of market foreclosure[229] or raising rivals' costs due to exclusionary practices.[230] Second, hospital contracting for physician services may affect the horizontal structure of the physician services market. Hospital contracting for physicians services often results

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[226]Recent revisions to the Federal Trade Commission/Department of Justice regulations on the formation of physician provider networks include: (1) September, 1993: Created safe harbors for physician network joint ventures composed of no more than 20 percent of the physicians in any specialty in a geographic market who share substantial financial risk; (2) September, 1994: Added safe harbors for nonexclusive physician networks having up to 30 percent of the physicians in any specialty in a geographic market who share substantial financial risk; and (3) August, 1996: Began to evaluate physician networks with the "rule-of-reason" standard. Evidence of integration that leads to efficiencies includes capitated payment, withholds of physician reimbursement, financial incentives for physician groups to achieve cost or utilization targets, global payment rates for major procedures, risk-sharing arrangements for a percentage of enrollees' premiums, non-risk-sharing arrangements that involve integration to improve the clinical quality of services or reduce unnecessary service utilization. See Jaklevic, *supra* note 58.

[227]The results may also help health plans and providers understand the cost and quality control capabilities of rapidly evolving forms of hospital contracting for physician services, and government programs and health plans in evaluating insurance licensing and solvency due to increased delegation of financial risk to physician practices under hospital contracting.

[228]Oliver E. Williamson, Assessing Vertical Market Restrictions: Antitrust Ramifications of the Transaction Cost Approach, Univ. Penn. Law Rev. 127 (1979).

[229]K. M. Fenton & B. C. Harris, Vertical Integration and Antitrust in Health Care Markets, 39 Antitrust Bull. 2 (1994).

[230]S. C. Salop & D. T. Scheffman, Raising Rival's Costs, 73 Amer. Econ. Rev. (1983).

in consolidation of previously independent physician practices,[231] which can raise concerns of monopolization of physician services. Physician networks may also be challenged on grounds of price-fixing and exclusionary practices.

Antitrust enforcement officials are increasingly concerned about both the vertical and horizontal ramifications of hospital contracting for physician services. Both the FTC and DOJ have recently accepted settlements in cases involving vertical mergers between hospital and physician organizations, and the horizontal effects of consolidating competing physician practices during hospital acquisition of physician practice organizations (especially PHOs) have been central to at least three of the cases.[232] While federal antitrust regulatory agencies have increased their scrutiny of physician networks, they rejected only four of forty-eight proposed physician networks that asked for business review letters between September, 1993 and December, 1996.[233] One of the largest health care antitrust cases was Blue Cross and Blue Shield United of Wisconsin v. Marshfield Clinic (883 F. Supp.1247 (W.D. Wisc.1995) involved hospital vertical integration into physician services, alleged to cause monopolization of physician services and foreclosure of HMO entry. Hospital staff privileges as a barrier to entry to excluded physicians was at issue.[234] Unlike hospitals undergoing merger, physician networks are not required to notify federal agencies of their intent to consolidate. Regulatory authorities often learn

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[231]Abbey & Treash, *supra* note 36; Morrisey *et al*, *supra* note 57.

[232]Simpson, *supra* note 212.

[233]Forty of the approved physician networks fell outside the safe harbor provisions. In the two year period beginning September, 1995, four PHOs settled charges involving price-fixing, attempted monopolization, and group boycotts. In addition, Mesa County Physicians IPA in Grand Junction, Colorado, is nearing a settlement with the FTC. Brown & Toland Medical Group, a capitated IPA with 1,250 physicians in San Francisco, is also under investigation. See Jaklevic, *supra* note 58.

[234]Warren Greenberg, Marshfield Clinic, Physician Networks, and the Exercise of Monopoly Power, 33 Health Serv. Res. 5 (1998).

about potential anticompetitive behavior from health plans who claim market foreclosure or physicians who were excluded from the network. Health plans are reticent to initiate antitrust challenges of monopolization in some markets for fear of losing contracts with essential physician networks;[235] the costs of undertaking antitrust challenges may not exceed the potential remedies in all markets.

Most antitrust actions against physician networks to date have involved price-fixing, exclusive contracting, or market foreclosure.[236] Provider consolidation and more exclusive contracting arrangements under managed care may be raising entry barriers and the potential for collusion in the physician services market, while potential efficiency gains remain unclear.[237] Hospitals most frequently arrange exclusive contracts for hospital-based physicians such as radiologists, anesthesiologists, pathologists, and emergency room physicians. Intense competition for physician affiliations under managed care has brought exclusive contracts for many primary care and specialist physicians such as those in internal medicine, cardiology, obstetrics and gynecology, and thoracic surgery.[238] Studies of industrial markets have demonstrated that firms are more likely to use exclusive dealing when other manufacturers can free ride on the services they provide.[239] Hospitals attempt to affiliate with physicians who have the strongest

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[235]Jaklevic, *supra* note 58.

[236]James H. Sneed & Matthew C. Rosser, Provider Network Formation and Operation: Antitrust Guidance in Light of Recent Enforcement Activities, Health Law Handbook (1996); Deborah Haas-Wilson & Martin Gaynor, Increasing Consolidation in Healthcare Markets: What are the Antitrust Policy Implications?, 33 Health Serv. Res. 5 (1998).

[237]Deborah Haas-Wilson & Martin Gaynor, Physician Networks and their Implications for Competition in Health Care Markets, 7 Health Econ. 2 (1998).

[238]Bryan A. Liang, An Overview and Analysis of Challenges to Medical Exclusive Contracts, 18 J. Legal Med. 1 (1997).

[239]Jan B. Heide, Shantanu Dutta, & Mark Bergen, Exclusive Dealing and Business Efficiency: Evidence from Industry Practice, 41 J. Law Econ. 2 (1998).

reputation for cost-effective and high quality practice of medicine, and they secure investments in physician practices through long-term contracts.

The antitrust case law on hospital contracting for physician services is relatively undeveloped compared to that of hospital mergers. Yet even for hospital mergers, there are substantial differences in the court opinions on such pivotal issues as product and geographic market definition, the extent of merger-specific efficiencies, and the influence of non-profit status. "The lack of conclusive empirical economic evidence on these topics undoubtedly contributes to the current divergence of opinion among regulators, courts and hospitals."[240]

This study has identified plausible efficiency-enhancing motivations for hospital entry into the market for physician services. In particular, hospitals contract for physician services to select physicians with cost-effective practice patterns and to choose the form of physician practice organization that meets the market demand for cost and quality control. Hospitals make specialized investments in financial and intellectual capital assets of the physician practice to become more successful in obtaining managed care contracts and in controlling hospital cost and quality of care. However, this study finds that hospital contracting for physician services generally increases hospital total operating costs in the short-run except in the case of group practice. While some forms of hospital contracting for physician services help hospitals obtain managed care contracts, they do not provide additional patients (and associated revenues) commensurate with the increase in costs.

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[240]Noether, *supra* note 255.

The empirical analyses in this dissertation report the performance implications of hospital contracting for physician services in the aggregate. Hospital contracting for physician services has substantial efficiency ramifications. Available data do not permit assessment of hospital market power in the physician services market nor direct measurement of hospital revenues, thus it is not possible to fully assess the anticompetitive potential of hospital contracting for physician services. Antitrust evaluation of the merits of hospital entry into the market for physician services should continue to be performed on a case-by-case rule of reason basis, wherein the competitive or anticompetitive nature of specific actions are evaluated under prevailing market conditions.

APPENDIX 1: DATA SOURCES

1. DATA SOURCES AND VARIABLE CONSTRUCTION

The hospital-level data were primarily derived from the 1993 and 1996 Annual Survey of Hospitals by the American Hospital Association (AHA), which include virtually 100 percent of general and specialty hospitals.[241] Federal, specialty and long-term care, small, and rural hospitals each have unusual governance constraints and receive operating subsidies that are not available to most short-term general acute care hospitals. To reduce the extreme heterogeneity in the sampling frame, only non-federal short-term general acute care hospitals of 25 or more staffed beds in metropolitan statistical areas (MSAs) of the United States were retained, corresponding to 2,502 hospitals in 1993 and 2,176 in 1996. Hospitals that were not included in the surveys for both years and those that did not respond to questions which are analytic variables in the model were also excluded, leaving a panel of 1,904 short-term general acute care hospitals nationwide.

The dependent variable for the model of hospital choice of contracting form (open-panel PHO, closed-panel PHO,[242] IPA, group practice[243]), the dependent variable for the model of effects of contracting for physician services on hospital performance (total

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[241] American Hospital Association, Annual Survey of Hospitals, 1993, 1996.

[242] Hospitals with PHOs in 1993 were assumed to have the open vs. closed-panel PHO characteristics identified in 1994 AHA survey, the first year that the distinction was recorded.

[243] Hospital-owned group practices share administrative expenses but are not always consolidated into a single practice location. Hospitals contribute substantial capital to these enterprises, but they may not achieve as cohesive a group culture as a physician-owned group practice. However, hospital-owned group practices are more similar to integrated firms than networks.

costs, cost per patient day), and many independent variables are derived from AHA surveys. These surveys identify essential characteristics of individual hospitals including total operating cost,[244] ownership (for-profit, government, or private non-profit), health care system membership, number of fully-staffed general acute care beds, annual number of patient discharges, patient days, outpatient visits to hospital clinics and outpatient facilities, the forms of hospital contracting for physician services, and the corporate sponsor of each contract form (hospital or hospital subsidiary, system, or contractual network).[245] A case-mix index to measure patient severity of illness for each hospital relative to others (cross-sectionally and over time) was obtained from the Health Care Financing Administration (HCFA). The case-mix index helps control for output variation that is not reflected in the number of patient discharges or intensity of service (i.e., length of stay). While this case-mix index applies only to Medicare patients, changes in the index over time generally track overall changes in hospital case mix.[246]

Hospital market structure data was linked to market areas using the hospital's zip code, FIPS county code, and MSA code; market areas are defined below. The market measures are designed to capture factor input prices, differences in competition amongst

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[244]The reported total hospital operating cost includes the cost of hospital inpatient care and outpatient clinics attached to the hospital; it does not include the cost of setting up and operating hospital-physician contracting entities, purchasing physician practices, or payment to physicians. Outside of the hospital, the vast majority of physician services are delivered in doctors' offices that are not part of hospital outpatient clinics. Thus change over time in reported hospital operating cost primarily reflects change in hospital production efficiency and governance.

[245]Ideally, we would study hospital contracting for physician services by examining the implementation of incentive and control mechanisms in each contract. However, these data are not publicly available nor are they tabulated in any centralized repository; they are considered to be of great strategic importance and hence highly proprietary. What we do observe (through regular surveys) is hospital use of various contractual forms with particular combinations of cost and quality control mechanisms.

[246]Kenneth E. Thorpe, Why are Urban Hospital Costs So High? The Relative Importance of Patient Source of Admission, Teaching, Competition, and Case Mix, 22 Health Serv. Res. 6 (1988); J. Pettengill & J. Vertrees, Reliability and Validity in Hospital Case-Mix Measurement, 4 Health Care Fin. Rev. 2 (1982).

hospitals, HMO market structure, and the structure of physician services. Input price variation accounts for much of the geographic variation in hospital costs, and wage levels are the main component of variance. Hospitals operate in national capital markets, so geographic variation in the price of capital is minimal and is not included in the models. Hospital market-level input prices are measured by the annual HCFA wage index developed for the Prospective Payment System, which measures the cross-sectional variation between hospitals in each MSA. To account for differences in wage rates over time, the hospital wage index is multiplied by the national average hourly earnings of hospital production workers in each year released by the Bureau of Labor Statistics.[247] Hospital concentration is measured by a Herfindahl-Hirschman Index (HHI) of hospital admissions in each county,[248] derived from AHA data on admissions to each hospital. Health plan market-level demand for cost and quality control was characterized by two variables. HMO penetration measures the percentage of residents in each MSA market area that are insured through any HMO insurance arrangement, commercial or governmental; it represents the maturity of the HMO market (i.e., the stringency of cost and quality controls by HMOs). The number of HMOs operating in each market was included as a measure of HMO competition; for a particular level of HMO market penetration, a greater number of HMOs signals stronger competition. Both variables come from Interstudy's Regional Market Analysis surveys for 1994[249] and 1996,[250] which

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[247]U.S. Bureau of Labor Statistics, National Employment, Hours, and Earnings, Average Hourly Earnings of Production Workers, Hospitals, 1993 and 1996.

[248]The HHI denominator is based on all market area hospitals, not just those included in the final sample. Total hospital admissions for all general acute care services are used, thus this HHI measures concentration of hospital *aggregate* production.

[249]The response rate for the1993 survey was relatively low since it was the first year that InterStudy collected MSA market-level data. 1994 data was used for the 1993 data in the sampling frame. Response

include nearly 100 percent of HMOs.[251] Physician group market structure was characterized by the percentages of primary care physician reimbursement and specialty care physician reimbursement paid on a capitated basis, obtained from the InterStudy surveys of HMOs for 1994 and 1996. These variables measure the stringency of the physician services market *vis-a-vis* physicians' ability to assume financial risk and control cost and quality of care. Only one pertinent regulatory variable changed over the study period.[252] Some states have enacted Any Willing Provider (AWP) regulations, which require health plans and other entities that are forming physician networks to contract with any willing physician provider in their market areas.[253] AWP regulation restricts the ability of health plans and hospital-physician contracting entities to form physician panels that contain only the most cost-conscious physicians, potentially raising the cost of entry into the market for physician services and reducing the hospital's ability to contain cost growth. This study only considers state AWP regulation to be in effect if it was relatively stringent; it must apply to most HMOs and most types of physicians.[254]

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rates for the1994 and 1996 surveys are very high.

[250]InterStudy, The Competitive Edge: Regional Market Analysis, 1994-1996.

[251]Interstudy provides local market level HMO, but not PPO or other managed care, penetration. There is no reliable source of PPO local market penetration data; HMO enrollees and PPO eligibles are double-counted and there is no way to verify data or fill in missing elements since PPOs do not file with most state agencies for licensing (Personal communication with Nancy Lincoln, Interstudy, October 16, 1997). If a reliable source is found it will be used, and HMO and PPO HHIs will be weighted by their respective market shares.

[252]Due to lack of change over the study period, variables for other forms of pertinent regulation (e.g., corporate practice of medicine) were collinear with the fixed effects and thus were dropped from the estimation.

[253]Ernst & Young, LLP, Physician Hospital Organizations: State Regulators Play Catch-Up, 1994; Intergovernmental Health Policy Project, Kaiser Commission on the Future of Medicaid, 1994; National Governors' Association, State Regulation of Managed Care Entities, 1996; J. A. Marsteller *et al*, *supra* note 37.

[254]AWP regulation stringency was determined by the author's analysis of Marsteller *et al*, *supra* note 37; stringent HMO AWP regulations were in place for fifteen states in 1993 and eighteen in 1996, with more stringent regulations adopted in Georgia, Texas, and Utah over the period.

Table A1.1: Data Sources and Variable Coding

Variable	Variable Coding	Data Source
Physician Practice Organization	*Hospital has/is:*	
Network		
Open-panel PHO	1=yes, 0=no	AHA (1993, 1994, 1996)
Closed-panel PHO	1=yes, 0=no	AHA (1993, 1994, 1996)
IPA	1=yes, 0=no	AHA (1993, 1996)
Integrated		
Group Practice	1=yes, 0=no	AHA (1993, 1996)
Relationship to the Hospital		
Long-term contract	1=yes, 0=no	AHA (1993, 1996)
Unified ownership	1=yes, 0=no	AHA (1993, 1996)
Hospital Characteristics		
Operating costs ($)		AHA (1993, 1996)
Operating cost per day ($)		AHA (1993, 1996)
Scale (staffed beds)		AHA (1993, 1996)
For-profit	1=yes, 0=no	AHA (1993, 1996)
Non-profit	1=yes, 0=no	AHA (1993, 1996)
Government	1=yes, 0=no	AHA (1993, 1996)
System member	1=yes, 0=no	AHA (1993, 1996)
System scale (staffed beds)		AHA (1993, 1996)
Market Structure		
Case-mix index		HCFA (1994, 1996)
Stringent state AWP regulation	1=yes, 0=no	Marsteller *et al* (1997)
HHI of hospital discharges		AHA (1993, 1996)
HMO penetration (%)		InterStudy (1993, 1996)
Number of HMOs		InterStudy (1993, 1996)
Primary care reimb. capitated (%)		InterStudy (1993, 1996)
Specialty care reimb. capitated (%)		InterStudy (1993, 1996)
Hospital care reimb. capitated (%)		InterStudy (1993, 1996)
Factor Prices and Outputs		
Wage index		HCFA (1993, 1996)
National average hourly wage ($)		BLS (1993, 1996)
Hospital discharges		AHA (1993, 1996)
Inpatient days		AHA (1993, 1996)
Average length of stay (days)		AHA (1993, 1996)
Outpatient visits		AHA (1993, 1996)

2. Market Definition

Market definition is pivotal in studying hospital behavior and assessing

competition.[255] Four definitions have been used in prior research: zip code patient origin data, 15-mile radius around hospitals, county, and metropolitan statistical area (MSA).[256] Three substantive issues arise: actual versus potential competitors, variation in provider and patient density, and inclusion of non-competitors. Each definition has limitations and none resolves all three issues. Patient origin data identifies historical hospital rivals[257] but has two drawbacks. First, it omits hospitals that compete for, but do not obtain, managed care contracts.[258] The potential threat of new entrants imposes discipline on firm behavior, the basic premise of contestable market theory.[259] Conduct changes quickly even with second or third entrants.[260] The nonresponse bias due to omitting potential competitors would grow as hospitals seek broader markets to stem declines in occupancy rates and maintain minimum efficient scale for specialized services. Second, patient origin data requires costly and cumbersome discharge abstract data. Markets measured by number of neighboring hospitals within a 15-mile radius reflect the distance physicians can reasonably be expected to travel,[261] but overlook inter-market hospital and population density variation; analogous measures are not available for physician and health plan

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[255]Monica Noether, Economic Issues in the Antitrust Assessment of Hospital Competition: Overview, 5 Int'l. J. Econ. Bus. 2 (1998).

[256]Deborah W. Garnick, Harold S. Luft, James C. Robinson, & Janice Tetreault, Appropriate Measures of Hospital Market Areas, 22 *Health Serv. Res.* 1 (1987).

[257]Jack Zwanziger, Glenn A. Melnick, & J. M. Mann, Measures of Hospital Market Structure: A Review of the Alternatives and a Proposed Approach, 24 Socio-Econ. Plan. Sci. (1990).

[258]Deborah W. Garnick *et al*, *supra* note 256.

[259]William Baumol, Contestable Markets: An Uprising in the Theory of Industry Structure, 72 Am. Econ. Rev. 1 (1982).

[260]Timothy F. Bresnahan & Peter C. Reiss, Entry and Competition in Concentrated Markets, 99 J. Pol. Econ. 5 (1991).

[261]James C. Robinson & Harold S. Luft, Competition, Regulation, and Hospital Costs, 1982 to 1986, 260 J. Amer. Med. Assoc. 18 (1988).

market structure. Counties overstate the number of historical competitors;[262] MSAs may span several hospital markets.[263] County and 15-mile radius measures result in similar measures of competition, while patient origin data results in generally less competitive market profiles with hospitals skewed toward higher HHIs.[264] Crossover effects of adjacent markets decline in broad markets like MSAs.[265] Health plan competition occurs over broad geographic areas, such as counties or even MSAs. However, MSA-level HMO penetration data is more reliable than county-level data.[266] For this study, counties are the most appropriate definition for hospital markets, and MSAs for health plan and physician group markets.

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[262]Jack Zwanziger *et al*, *supra* note 257.

[263]Deborah W. Garnick *et al*, *supra* note 256.

[264]Deborah W. Garnick *et al*, *supra* note 256.

[265]David Dranove & Mark Shanley, A Note on the Relational Aspects of Hospital Market Definitions, 8 J. Health Econ. 4 (1989).

[266]Health plans could not accurately report county-level HMO enrollment and PPO eligibles before 1997, although MSA-level figures are thought to be reliable (Personal communication with Nancy Lincoln, Interstudy, October 16, 1997).

APPENDIX 2: PHYSICIAN PRACTICE GOVERNANCE MECHANISMS

How physicians respond to incentive and control mechanisms has received considerable empirical scrutiny.[267] Physician behavior cannot be specified for every possible situation in advance, it is difficult and expensive to monitor, and direct observation is often not feasible without interfering with patient care.[268] Physician practices use price and nonprice mechanisms to instill performance incentives and to regulate the cost and quality of production. These governance mechanisms have a strong impact on physician behavior,[269] yet the observed forms of hospital contracting for physician services differ in their ability to implement them. Incentives and administrative controls primarily take the form of selective contracting, utilization management, and payment mechanisms.[270] Also, physicians may participate in governance via board or committee membership, or be given an ownership stake in the hospital-physician organization. This section describes how physician practices use these governance mechanisms to influence the cost and quality of health care services.

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[267]Physician practice patterns are influenced by payment mechanisms and utilization management methods, scale of the physician group practice and the mix of individual and group performance incentives. See Robinson, *supra* note 65; Randall P. Ellis & Thomas G. McGuire, Provider Behavior under Prospective Reimbursement, 5 J. Health Econ. 2 (1986); Mark V. Pauly, Economics of Multispecialty Group Practice, 19 J. Amb. Care Mgmt. 3 (1996); and Brian S. Ferguson, Physician Objectives and Resource Allocation, 4 J. Health Econ. 1 (1985).

[268]Pontes, *supra* note 86.

[269]Robert Miller and Harold S. Luft, Managed Care Plan Performance Since 1980, 271 J. Amer. Med. Assoc. (1994); Fred J. Hellinger, The Impact of Financial Incentives on Physician Behavior in Managed Care Plans: A Review of the Evidence, 53 Med. Care Rsch. & Rev. 3 (1996).

[270]Robinson, *supra* note 65.

1. SELECTIVE CONTRACTING

Selective contracting is a constrained payment system in which buyers contract with a limited number of sellers based on their qualifications and prior performance, thereby establishing a competitive bidding process. In managed care contracting, a health plan can legally exclude hospitals and physicians from its list of participating providers without significant threat of antitrust prosecution. Health plans negotiate terms with each selected provider, whom they will reimburse for services to their subscribers. While the original intent of selective contracting by health plans was to obtain volume discounts from physicians and hospitals, under managed care the focus has shifted to choosing providers with cost conscious practice styles.[271] Selective contracting for hospital inpatient care has substantially reduced the rate of hospital cost inflation.[272]

Hospitals also selectively contract with physician practices. Physicians' professional credentials are evaluated before the initiation of a contract, at contract renewal, and before determination of hospital privileges.[273] The expansion of managed care has spurred credentialing changes in three areas: physician profiling, economic credentialing, and exclusive contracts.[274]

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[271]Robinson, *supra* note 65.

[272]James C. Robinson and Ciaran S. Phibbs, An Evaluation of Medicaid Selective Contracting in California, 8 J. Health Econ. 4 (1989); Jack Zwanziger, Glenn A. Melnick, J. Mann, & L. Simonson, How Hospitals Practice Cost Containment with Selective Contracting and the Medicare Prospective Payment System, 32 Med. Care 11 (1994); Jack, Zwanziger, Glenn A. Melnick, & A. Bamezai, Costs and Price Competition in California Hospitals, 1980-1990, 13 Health Aff. 4 (1994).

[273]Hospital boards generally delegate the credentialing process to their medical staff as delineated in staff bylaws, while credentialing criteria are influenced by state laws and national accrediting bodies such as the Joint Commission on Accreditation of Health Organizations. See John D. Blum, The Evolution of Physician Credentialing into Managed Care Selective Contracting, 22 Amer. J. Law Med. 2-3 (1996).

[274]Blum, *supra* note 273.

Statistical profiles of physician practice are used to compare individual or collective physician practices to their peers along such dimensions as resource consumption (e.g., ancillary procedure usage), charges, and patient volumes and outcomes; some hospitals also track malpractice claims and third-party payment denials. Profiling is used by more than half of all hospitals, and the vast majority of hospitals share the profiles with physicians.[275] Physician profiles are compared to practice guidelines or other physician practices to evaluate performance, and are essential to the negotiation and structuring of managed care contracts. The dissemination of profiles to physicians has been effective in reducing patient length of stay in the hospital.[276]

Economic credentialing refers to the inclusion more explicit measures of the physician's contribution to financial performance in utilization review and internal quality improvement evaluations.[277] Hospital boards are the ultimate arbiters of credentialing, although physicians tend to view it as entirely within the medical staff's purview. Despite concerns over potential violations of hospital licensing laws, antitrust law, and Medicare fraud and abuse statutes, there have been few legal challenges to economic credentialing programs.[278]

In the 1980s, the majority of hospitals entered into exclusive contracting arrangements[279] with physicians in the hospital-based specialties of surgery, radiology,

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[275]Physician Payment Review Commission, Report and Recommendations to Congress, March 1, 1992, Washington, DC: PPRC.

[276]John H. Evans III, Yuhchang Hwang, & Nandu Nagarajan, Physicians' Response to Length-of-Stay Profiling, 33 Med. Care 11 (1995).

[277]John D. Blum, Economic Credentialing Moves from the Hospital to Managed Care, 22 J. Health Care Fin. 1 (1995).

[278]Blum, *supra* note 273.

[279]Despite challenges based on breach of contract, violation of bylaw procedures, and antitrust law, by

anesthesiology, pathology, and emergency medicine.[280] The majority of hospital contracts for physician services are not dual-sided exclusive contracts; they limit which physicians can admit patients to the hospital but allow physicians to practice at other hospitals. However, dual-sided exclusive contracts may become more common as physicians and hospitals become more tightly linked via unified ownership and long-term contractual arrangements under managed care.[281] Hospital unified ownership of physician practices may be thought of as an exclusive contract.

Hospital selective contracting forms a "closed panel" of physicians, whereby medical staff membership is restricted to physicians who meet not only basic requirements (e.g., accreditation, board certification, malpractice insurance) but criteria for cost effectiveness.[282] "Open panels" allow all members of the medical staff who wish to participate to join the panel. It is easier to observe behavior and implement performance evaluation systems in closed panels, where membership is more stable and panels are generally smaller.[283] However, the ability to selectively contract with the most cost-conscious physicians diminishes with increased scale of the physician network, as the remaining physicians in a market are less qualified. Health plans recognize this trade-off

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and large courts have upheld the validity of exclusive contracts, allowing the contract to be separate from the question of medical privileges. See Blum, *supra* note 273.

[280]Marshall Ruffin, Physician Profiling: Trends and Implications, 21 Phys. Exec. 11 (1995). Exclusive contracts ensure that these physicians are on the premises or on-call for a 24-hour day. They also facilitate acceptance of managed care contracts that require discounts on professional and hospital services, allowing hospitals to move faster into new markets with their physicians. See Mary T. Koska, Exclusive Physician Contracts Can Be a Win/Win Situation, 64 Hosp. 20 (1990).

[281]H.E. Frech, III & Kenneth L. Danger, Exclusive Contracts between Hospitals and Physicians: The Antitrust Issues, 7 Health Economics 2 (1998).

[282]Abbey & Treash, *supra* note 36.

[283]Peter R. Kongstvedt, Non-utilization-based Incentive Compensation for Physicians, in *The Managed Care Handbook*, 1996.

and prefer to have some limits on network size to ensure quality and cost control.[284] There is also increasing pressure from health plans to restrict managed care contracts to board-certified physicians.[285] Selective contracting alone does not ensure that physicians will maintain their cost-conscious practice patterns after they join the physician network; mechanisms to instill ongoing performance incentives and to monitor behavior must also be implemented.[286]

2. Payment Mechanisms and Performance Incentives

Physician payment mechanisms are one of the primary means of influencing the use of hospital resources, although hospital contracting for physician services generally has only an indirect influence on the mechanisms for paying individual physicians. In managed care contracting, a health plan contracts with a hospital-physician supplier network for hospital and physician services.[287] The hospital-physician supplier network establishes a contractual relationship between the hospital and a physician practice organization (e.g., a medical group practice), and it may also determine how payment from the health plan is split between the hospital and physician organization. The physician practice employs physicians or obtains their services as independent contractors, and determines how individual physicians are paid. When hospitals contract

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[284]Results of a study by the Policy Planning Associates, in Jaklevic, *supra* note 58.

[285]Gorey, *supra* note 70.

[286]Eisenberg, *supra* note 59.

[287]In practice, both three-tiered (health plan-physician organization-physician) and two-tiered (health plan-physician) legal covenants are found. However, hospital contracting for physician services involves setting up a hospital-physician supplier network for negotiations with health plans even if payment is made directly to the affiliated physicians.

for physician services, they choose to contract with a particular type of physician practice organization. This section provides an overview of payment mechanisms for physician practices under managed care, emphasizing distinctions between capitated and non-capitated payment.[288]

Health plans pay physician practice organizations in variety of ways, including fee-for-service (FFS), capitation, fee schedules, and incentive payments (e.g., risk pools, withholds, and bonuses). Stop-loss or risk-limiting protection may be provided to limit losses from extraordinarily costly cases.[289] In 1994, the market level of capitated HMO payments to physician practices as a percentage of total payments averaged 45 percent for primary care services and 17 percent for specialty care.[290] Another recent survey of physician practices found substantial differences in capitated payments to physician practices by specialty (Table A2.1).[291] The level of capitated payments to physician practices is generally highest in markets where physician and hospital organizations have developed the most stringent methods of controlling cost and quality of care.

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[288]The data used in this study's empirical analyses distinguish between capitated and non-capitated payments to physician practices, but not payments to individual physicians. While other forms payment may have ramifications for physician behavior, this study does not rely on them for any research hypotheses or interpretation of empirical results.

[289]Norbert I. Goldfield et al, Methods of Compensating Physicians Contracting with Managed Care Organizations, 15 J. Amb. Care Mgmt. 4 (1992).

[290]This is an unweighted average of market level capitated payment rates across all metropolitan areas for all HMOs. See InterStudy, The InterStudy Competitive Edge 5.1, Part III: Regional Market Analysis, 1995.

[291]Dahlia K. Remler et al, What Do Managed Care Plans Do to Affect Care? Results from a Survey of Physicians, 34 Inquiry 3 (1997).

Table A2.1: Capitated Payments to Physician Practices, 1995[a]

Payment Mechanism	All Physicians	Primary care	Specialists Medical	Specialists Surgical
Physicians				
% whose practice receives some capitation	.41	.56	.32	.28
Patients				
% for whom capitation is paid to practice	.13	.18	.10	.10

[a] Source: Survey of 2,003 physicians nationwide in Remler *et al*, 1997.

Although health plans may pay physician practices on a capitated basis to encourage cost conscious behavior, physician practices may pay their physicians in other ways. The effect of payment mechanisms for individual physicians depends on the scope of services linked to their payments (i.e., physician services, hospitalization, or both). When physician practices pay individual physicians on a capitated basis, the payment typically covers only the services the physician provides; groups of physicians are better able to spread the financial risk for a broader range of services.[292] Most physicians are paid salary, fee-for-service, or one of these methods in combination with incentive payments based on individual and/or group performance (Table A2.2).

Table A2.2: Payments to Individual Physicians, 1995[a]

Payment Mechanism	All Physicians	Primary care	Specialists Medical	Specialists Surgical
Fee-for-service or discounted FFS	.26	.09	.34	.42
Salary	.34	.43	.36	.22
FFS or salary plus incentive payments	.16	.17	.14	.16
Capitation	.24	.31	.16	.20

[a] Source: Survey of 2,003 physicians nationwide. See Remler *et al*, 1997.

[292] Robinson, *supra* note 92.

In 1994, approximately 60 percent or more of physician practices, hospitals, and integrated delivery systems offered physicians incentive payments ranging from 5 to 15 percent of total compensation, and based from 40 to 60 percent on individual productivity.[293] In recent years, some physician practices have begun paying primary care physicians on a fee-for-service basis to encourage utilization of relatively inexpensive primary care and preventive services, while paying for expensive specialist care on a capitated basis.

How physicians respond to payment mechanisms and performance incentives has received considerable empirical scrutiny.[294] Fee-for-service payment gives physicians a financial incentive to provide more services. A salary by itself does not provide incentives to decrease or increase services, but physician productivity drops when the shift is made from FFS to salaried payment due to weaker performance incentives. Capitated payment of physicians provides strong incentives to control the use of resources for which physicians are reimbursed for. The effects of physician payment on hospital

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[293]Results of the 1994 Physician Compensation Survey conducted by Ernst & Young LLP, representing 89 physician practice organizations. Physician group practices offering incentive-based payment, incentive payments averaged 10 percent of total compensation. Sixty percent of incentive payments were based on individual physician performance; the remainder was linked to departmental performance, organizational profit-sharing, or partnership distributions. Incentive pay tends to be based on readily available financial measures, such as net collections (50 percent), gross charges (40 percent), and service and overhead costs (10 percent). Hospitals and integrated healthcare delivery systems treat physician incentive payments differently. Fifty-six percent of hospitals awarded incentive payments (or bonuses) to their physician employees, with incentive payments averaging 15 percent of total compensation. Forty percent of hospitals based incentive payments on individual productivity, 10 percent on departmental performance, and 50 percent on discretionary bonuses based on subjective standards. Seventy-three percent of integrated delivery systems offered incentive payments to physicians, with incentive payments averaging 5 percent of total compensation. More than 60 percent based incentive payments on individual productivity, while the rest based it on employee seniority, departmental performance, or discretionary factors. See David R. Bledsoe, William B. Leisy, & James A. Rodeghero, Tying Physician Incentive Pay to Performance, 49 Healthcare Fin. Mgmt. 12 (1995).

[294]Robinson, *supra* note 65; Gaynor & Gertler, *supra* note 267; Ellis & McGuire, *supra* note 267; Pauly, *supra* note 267; and Ferguson, *supra* note 267.

resource utilization under managed care have also been documented.[295] For example, primary care physicians who were paid a salary had 13.1 percent fewer hospital days per HMO enrollee compared to those under FFS, and those paid capitation had 7.5 percent fewer hospital days per enrollee compared to those under FFS. Putting primary care physicians at-risk for deficits in their specialist referral budgets reduced outpatient visits by 10.5 percent per enrollee.[296]

3. Utilization Management and Monitoring

Physician payment incentive mechanisms are often used in conjunction with direct controls on the provision of services. Traditional utilization management mechanisms include preadmission certification for hospitalization, mandatory second opinion before surgery, concurrent review of patient length of stay in the hospital, case management of high-cost patients, preauthorization for referrals to specialists, and retrospective review of services (Table A2.3). These arms-length mechanisms for reducing unnecessary and inappropriate utilization are expensive to implement due to the difficulty in monitoring physician practice, they're only cost-effective for the most expensive services, and they are easily eluded by physicians who claim their patients to be unique or services to be necessary.[297] Alternatively, utilization management incentives can be instilled by payment mechanisms (e.g., prospective payment) or the structure of physician group

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[295]Miller & Luft, *supra* note 269; Hellinger, *supra* note 269.

[296]A. L. Hillman, M. V. Pauly, & J. J. Kerstein, How Do Financial Incentives Affect Physicians' Clinical Decisions and the Financial Performance of Health Maintenance Organizations?, 321 New Eng. J. Med. 2 (1989).

[297]Robinson, *supra* note 65.

practices, which encourages ongoing peer review, education, and innovation through a nonadversarial relationship.[298] There is strong evidence for the effect of peer pressure, professional leadership, and group styles of practice in determining the levels of use of services, and these effects are stronger in more formally organized practices.[299] Physicians who join group practices frequently adopt conservative practice patterns even when they continue to be paid on a fee-for-service basis.[300] Health plans delegate some or all of the responsibility for utilization management to providers if payment mechanisms and organizational structures are in place to encourage high quality and cost-conscious practice of medicine.

Table A2.3: Utilization Management Mechanisms, 1995[a]

	All	Primary	Specialists	
Share of patients (%) for whom:	Physicians	care	Medical	Surgical
Length-of-stay is reviewed	.59	.58	.56	.62
Site of care is reviewed	.45	.45	.40	.49
Treatment appropriateness is reviewed	.39	.38	.34	.43
Treatment protocols are used	.16	.17	.12	.16
Physician profiling is used	.16	.22	.21	.13
Physician is on a restricted panel	.25	.29	.24	.23
Physician gatekeeper is used	.20	.40	.06	.04

[a] Source: Survey of 2,003 physicians nationwide. See Remler, *et al*, 1997.

Under managed care, primary care physicians often act as gatekeepers (or case managers) who coordinate patient care in and out of the hospital and authorize referrals to

[298] Robinson, *supra* note 65.

[299] Eisenberg, *supra* note 59.

[300] S. Greenfield, E. C. Nelson, M. Zubkoff, et al, Variations in Resource Utilization Among Medical Specialties and Systems of Care: Results from the Medical Outcomes Study, 267 J. Amer. Med. Assoc. (1992).

expensive speciality physician care.[301] By 1997, approximately 40 percent of Americans with health insurance had a primary care gatekeeper, and 91 percent of primary care physicians serve as a gatekeeper for at least some of their patients.[302]

4. Physician Participation in Governance

The fourth main mechanism for influencing physician behavior is to encourage physician participation in governance of the hospital-physician supplier network (or the hospital). Physicians frequently participate in governance of hospital-physician contracting entities via board or committee (e.g., utilization and quality management) membership, although only to a limited degree.[303] Even when board membership is evenly divided between the hospital and physicians, hospitals often retain greater voting rights in return for assuming a larger share of the risk associated with financial losses in these ventures.[304] Physicians may provide start-up funds or have an ownership interest in these entities, although hospitals typically provide the vast majority of capital resources. Participation in governance allows physicians to voice the interests of their physician practices in hospital-physician contracting decisions. Providing physicians with an ownership stake ties their financial performance more closely to that of the hospital-

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[301]John M. Eisenberg, The Internist as Gatekeeper: Preparing the General Internist for a New Role, 102 Annals Int. Med. 4 (1985).

[302]Results of nationally representative samples of the Household (n=23,554) and Physician (n=9,264) Surveys conducted in 1996 and 1997 as part of the Community Tracking Study. See Robert F. St. Peter, Gatekeeping Arrangements in Widespread Use, 7 Data Bulletin: Center for Studying Health System Change (1997).

[303]Dana Kelley and Claire Sharda, Hospital-Physician Relations: A National Survey of Hospital Chief Executive Officers and Chiefs of Medical Staff, Prospective Payment Assessment Commission, 1995. The Internal Revenue Services limits physician representation on governance boards and nonclinical committees of tax-exempt integrated delivery systems to 20 percent; see Hastings, *supra* note 34.

[304]Pavelka, *supra* note 144.

physician supplier network, and reduces the problems associated with the separation of ownership and control.

There has yet to be a study of the effects of physician participation in governance of hospital-physician supplier networks on hospital performance. However, prior studies have examined the effects of physician participation in hospital governance. Before widespread expansion of managed care, physician participation in hospital governance generally resulted in higher hospital costs per patient discharge since physicians had few incentives to contain costs.[305] After the implementation of Medicare's Prospective Payment System for hospital care and the expansion of managed care in the 1980s, hospitals that shared governance or moderate levels of financial risk with physicians had higher operating margins those with high levels of physician governance and financial integration.[306] Including medical staff on the hospital's board and offering physicians management services significantly reduced average hospitalization costs of Medicare patients.[307]

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[305] Jeffrey Alexander & Michael A. Morrisey, Hospital-Physician Integration and Hospital Costs, 25 Inquiry 3 (1988).

[306] James B. Goes & ChunLiu Zhan, The Effects of Hospital-Physician Integration Strategies on Hospital Financial Performance, 30 Health Serv. Res. 4 (1995).

[307] Mark, Schur, & Guterman, *supra* note 103.

APPENDIX 3: MANAGED CARE CONTRACT PROVISIONS

Managed care contracts between health plans and providers are complex relational contracts designed to support long-term relationships under pervasive uncertainty, in contrast to discrete classical contracts where contract terms and contingencies can be completely specified at the time the bargain is struck (i.e., spot market contracts). [308] The key provisions of relational contracts define (1) contract commencement, duration, and termination; (2) measurement and specificity of products, prices, and quantities; (3) dividing and sharing of obligations, costs, and benefits; and (4) performance monitoring, enforcement of contract terms, and dispute resolution.

While there are several basic types of managed care contracts (i.e., PPO, non-capitated HMO, and HMO contracts[309]), most share a core set of attributes:[310] definition of covered individuals and services, organized provider networks, payment and utilization management mechanisms, and dispute resolution procedures. Health plans selectively contract with organized systems of health care providers for the delivery of a specific bundle of health care services to a defined population of "covered lives."[311] Providers

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[308]Under FFS insurance, hospital-physician relations are completely unspecified (i.e., there are no discrete contractual constraints) and are characterized by informal agreements. While these informal agreements are not truly spot market contracts, they do differ markedly from complex relational contracts. For ease of exposition, the informal agreements between hospitals and physicians under FFS insurance will be referred to as spot market contracts in this study.

[309]PPO contracts are not necessarily designed to be long-term in duration and are more discrete than HMO contracts, although both PPO and HMO contracts are easily distinguished from arms-length spot market contracts.

[310]David A. Weil & Jack T. Diamond, Managed Care Contract Provisions Requiring Attention, 8 Health Lawyer 5 (1995).

[311]HMO contracts define the specific population eligible for health care services, and HMO "membership" is typically tracked on an ongoing basis. PPO contracts do not explicitly specify the covered population, although health care services are only provided to covered beneficiaries.

include hospitals, hospital systems, individual physicians, physician organizations such as medical group practices, and other types of health care providers. Providers engage in exclusive or nonexclusive arrangements with health plans, although most are nonexclusive. Most managed care contracts are multi-year agreements with explicit renewal and termination provisions. In 1994, 16 percent of health plan contracts with physicians were for terms of less than one year, 53 percent were for one or two years, and 31 percent were for three or more years.[312] In general, contracts of at least two to three years are common,[313] although contract duration is steadily increasing;[314] health plans now frequently sign five to ten year contracts with physician practices.[315] Over three-fourths of hospitals that enter into agreements involving sharing of financial risk sign multi-year contracts.[316] Some contracts impose restrictive covenants prohibiting departing physicians from competing with the health care system (i.e., "noncompete" clauses) where permitted by state law or specify liquidated damage provisions before physicians enter into competing agreements;[317] nearly two-thirds of contracts have noncompete clauses of one or more years.[318]

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[312]Results of the 1994 Healthcare Executive Benefits Survey conducted by the American Hospital Association, the Healthcare Financial Management Association, the American Society for Healthcare Human Resources Administration, and Ernst & Young LLP. The 1,003 respondents included 883 acute care hospitals, 168 long-term care facilities, 114 specialty hospitals, 83 ambulatory care centers, 67 physician groups and independent practice associations, and 35 HMOs and PPOs. See David R. Bledsoe, William B. Leisy, & James A. Rodeghero, Tying Physician Incentive Pay to Performance, 49 Healthcare Fin. Mgmt. 12 (1995).

[313]Bruce W. Clark, Negotiating Successful Managed Care Contracts, 49 Health Care Fin. Mgmt. 8 (1995).

[314]Bledsoe, *supra* note 312.

[315]Korenchuk & Hord, *supra* note 16.

[316]From a Deloitte & Touche survey of 180 hospitals nationwide in 1997. See Terese Hudson, It's Worth the...Risk, 72 Hosp. Health Networks 4 (1998).

[317]Korenchuk & Hord, *supra* note 16.

[318]Bledsoe, *supra* note 312.

The contracts specify a set of "covered services" that must be provided to covered patients when "medically necessary," as well as who determines medical necessity. Product pricing and provider reimbursement may be specified for individual or bundles of services (e.g., "global capitation" for hospital and physician services). Payment methods for physician services include fee-for-service at customary list prices, discounts off list prices, fee schedules for specific services, fee per episode of treatment, a percentage of insurance premiums, or fixed prospective payments per covered individual (i.e., capitation).

Payment methods for hospital services include price per day (i.e., per diem), per case, per diagnosis (i.e., Diagnosis Related Groups, or DRGs), or capitation. Multi-year contracts signal the intention to engage in long-term business relationships, but they typically include provisions to adjust or renegotiate pricing on a yearly basis. Contracts specify how financial risk is to be shared between the health plan and providers, as well as who is responsible for performing utilization management, verification of enrollment status of patients, claims processing, and other administrative functions. In capitated HMO contracts, the HMO typically retains up to 20 percent of the insurance premium dollar for performing a broad range of administrative functions.[119] When some of these functions are delegated to the hospital or physician organization, the HMO share of the premium is reduced.

The provision of health care services is subject to "utilization management" mechanisms (e.g., preauthorization review, concurrent review, retrospective review, case

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[119]Penner, *supra* note 94.

management) designed to assure the quality of care, to limit unnecessary use of services, and to delimit circumstances under which services are reimbursable. Clinical and administrative performance is monitored mainly through utilization management mechanisms, reporting from administrative information systems, and by oversight of various medical management committees (e.g., the utilization review committee). Performance may be benchmarked against established standards of care for individual or groups of physicians, by disease, or along organizational lines.[320]

Disputes over contractual terms arise from the health plan, providers, or patients. Dispute resolution usually begins with the filing of a grievance to the health plan's medical director, a medical or nonmedical committee, or the director of a legal or administrative department.[321] Disputes are ultimately be resolved by arbitration, mediation, litigation, or contract termination.[322]

Hospitals increasingly take part in managed care contracts where financial risk for inpatient care is shared with physician practices or where revenue per patient is limited (e.g., under capitated payment for hospital inpatient care). A typical capitated contract divides up each dollar as follows: 40 percent for hospital care, 40 percent for physician services, and 20 percent for administrative costs paid to the HMO.[323] The size of payment shares partly reflects who is responsible for medical management. Hospital-

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[320]Nicholas A. Hanachak & Neil Schlackman, The Measurement of Physician Performance, 4 Quality Mgmt. Health Care 1 (1995); Timothy Alba, James Souders, & Gloria McGhee, How Hospitals Can Use Internal Benchmark Data to Create Effective Managed Care Arrangements, 2 Manag. Care Q. 2 (1994).

[321]Peter R. Kongstvedt, Elements of the Management Control and Governance Structure, in The Managed Health Care Handbook, 1996.

[322]Michael A. Duncheon & Dana B. Wolf, Key Provisions Strengthen Hospital Capitation Contracts, 50 Healthcare Fin. Mgmt. 11 (1996).

[323]Penner, *supra* note 94.

physician contracting entities that gain substantial expertise in managing utilization may attempt to capture a share of the administrative fees devoted to medical management. Capitated managed care contracts often establish financial risk pools for certain types of services, such as hospital care. Hospitals are usually paid from the pool on a per diem basis, but hospitals and physicians share in the savings (or losses) when it costs less (or more) to deliver services than provided by the accumulated capitation revenues at year end.[324] Hospitals are paid a greater share of the savings from reducing hospitalization costs (44 percent) than are primary care physicians (27 percent) or specialists (19 percent)[325] due to their greater capital investments. Thus, hospital contracting for physician services (in particular, via unified ownership) gives hospitals a means of capturing upstream economic quasi-rents[326] from physician practice.

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[324]Fred McCall-Perez, The Key to Remaining Competitive: Capitation, in Physician Equity Groups and Other Emerging Equity, 1997.

[325]Hudson, *supra* note 316, 325.

[326]Benjamin Klein, R. A. Crawford & A. A. Alchian, Vertical Integration, Appropriable Rents, and the Competitive Contracting Process, 21 J. Law Econ. (1978).

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